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THE IRON AGE

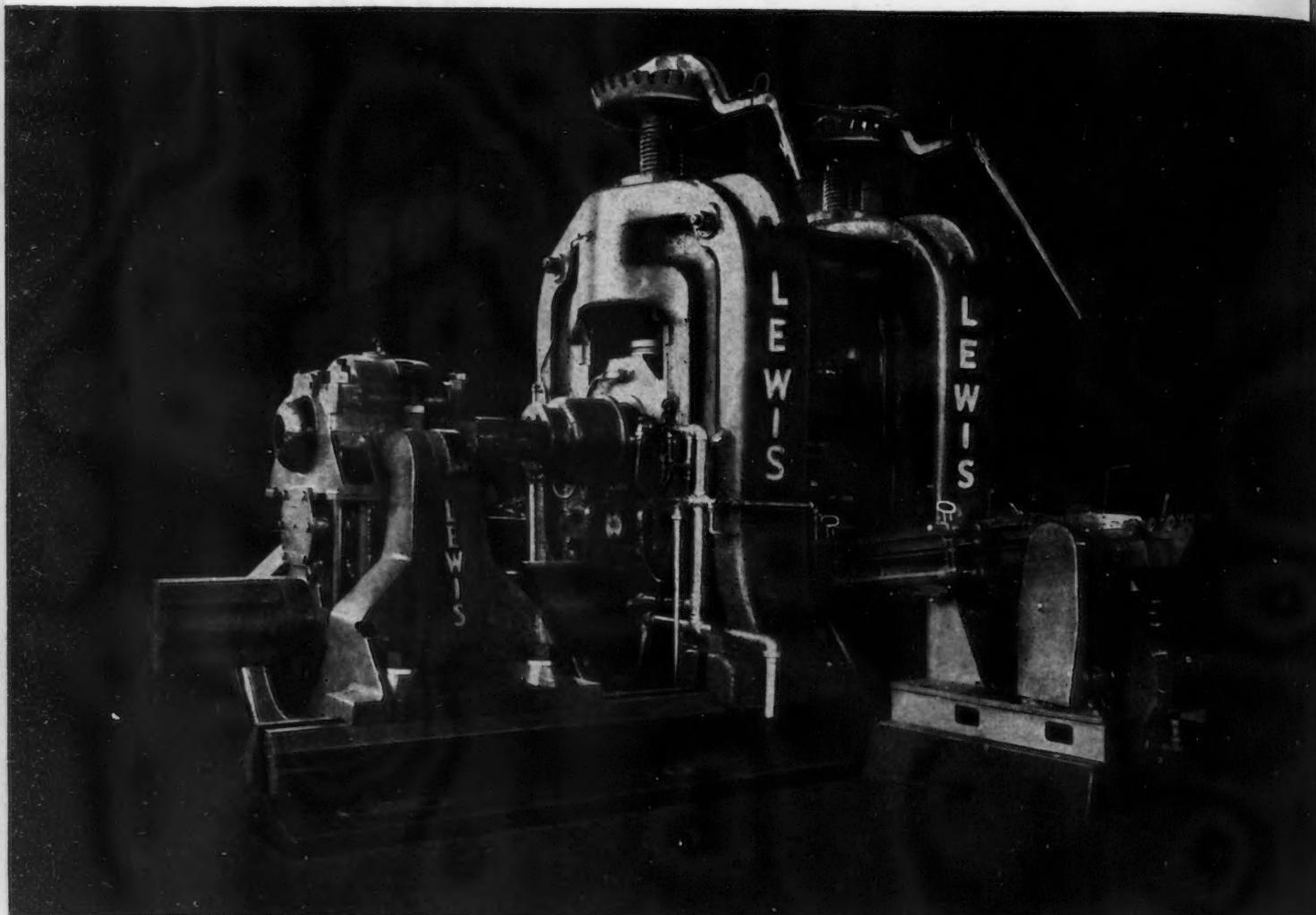
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LEWIS Reconstruction Reduces Rolling Costs . . .



This Lewis Mill has all water lubricated bearings, three station water control on rolls and bearings, special tables for handling special sheet bar, spindle carrier type top roll drive and balanced top roll.

The mill shown in the illustration is a special three high Lewis Mill in which the customer's old two high stands were used as a basis for construction. In operation it is now a modification of the standard Lewis Three High Mill providing important economies in operation and production.

Many operators can undoubtedly benefit by such profitable reconstruction. A consultation with Lewis Engineers is invited.



LEWIS FOUNDRY & MACHINE

DIVISION OF BLAW-KNOX CO.
PITTSBURGH, PA.

... THE IRON AGE ...

JULY 27, 1939

ESTABLISHED 1855

Vol. 144, No. 4

What Made the Dark Ages Dark?

ITTLE Willie has an inquiring mind and is quite keen about filling his information tank. One day he heard his teacher refer to the period known as the Dark Ages.

Willie raised his hand and popped a question. "Teacher," he asked, "what made the Dark Ages dark?"

Little Jimmie, his classmate, was as fond of handing out information, right or wrong, as Willie was of acquiring it. Up came his hand when teacher inquired if anyone could answer the question. "Well, Jimmie," asked the teacher, "what made the Dark Ages dark?"

And then this bit of wisdom from Jimmie: "The Dark Ages were dark, because they didn't have any electric lights in those days."

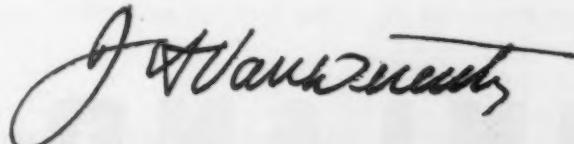
I do not know what mark Jimmie got for his answer, but it was not far from being the truth, if you consider the electric light as a symbol of mechanization and of the fruit of progress in all branches of applied science.

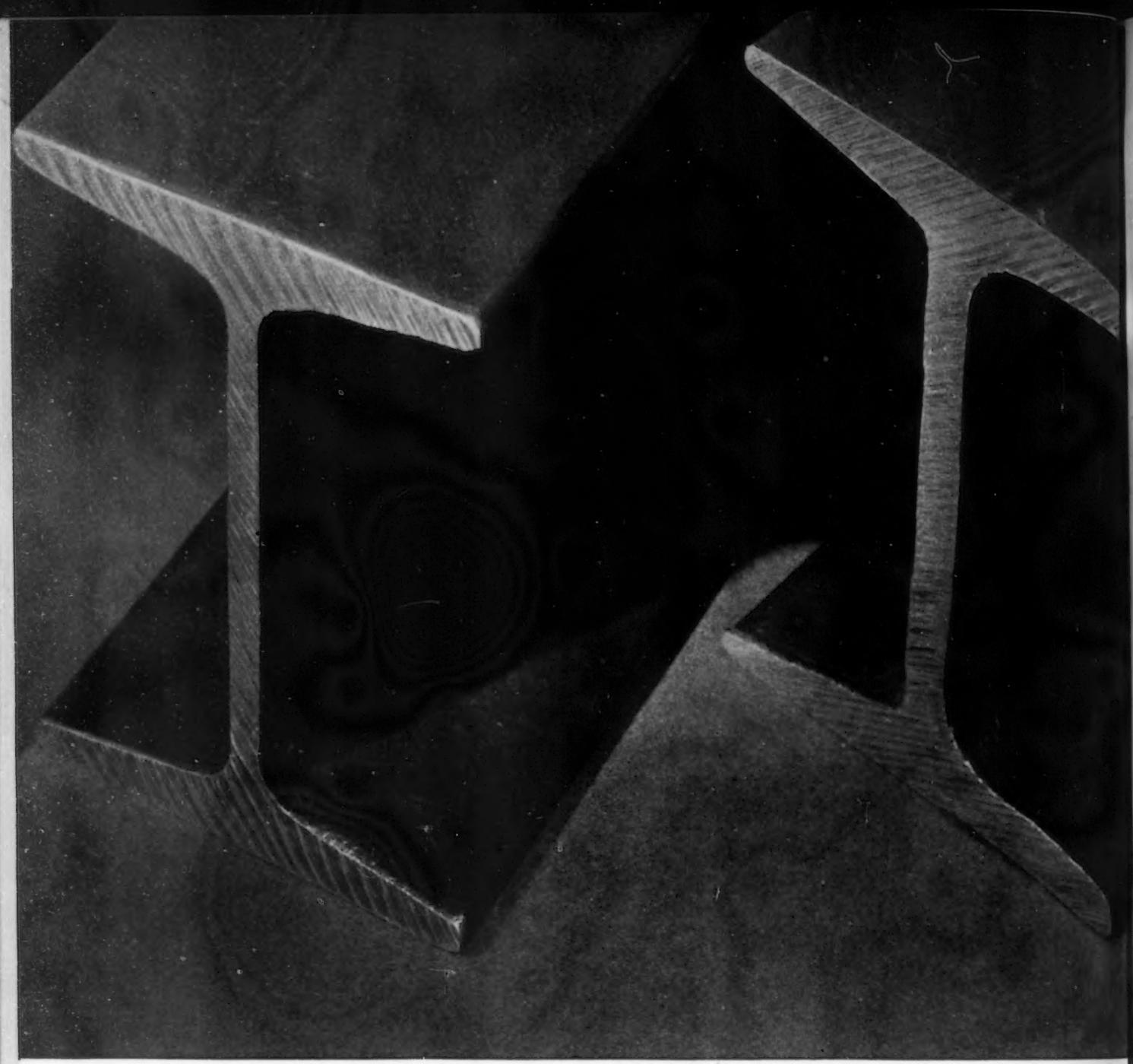
Of course one might carry this thought to an extreme which would disprove the rule. But thoughts carried to extremes usually get jumbled up before they reach their destination anyway. One might say, for example, that if electric light is a measure of progress and culture, then Broadway, New York, between Times Square and Columbus Circle is the most cultured and enlightened neighborhood in the world. And there would be considerable argument needed before that statement would be generally accepted.

However, those regions of the earth which have the most electric lights, not merely in concentrated areas but broadly spread—also have the highest standard of living for their wage earners. For where you have electric light you also have power. And electrical or mechanical power, measured in horsepower, also seems to measure the standard of living of wage earners.

Take the simple case of the ability of wage earners, in various countries, to obtain the world's most common luxury—cigarettes. In the United States with 4.86 hp. per wage earner, the average hourly wage will buy 112 cigarettes. In Germany, with 2.61 hp. per worker, it will buy 30. In Great Britain, with 2.56 hp., the hour's wage will buy 21. In Italy, with 2.14 hp. per worker, an hour's pay will buy only 15.

So you see that the injunction "Let there be light," made at the dawn of creation, is still good today. And when anyone says: "More power to you," he is indeed wishing you well.





Saving Weight and Fabrication Costs

The many uses of structural steel in equipment as well as in building construction offer numerous opportunities for the services of the Inland engineer to prove of real value.

Weight often can be reduced without sacrifice of structural strength. Ease of handling and appeal to the buyer's critical eye can often be "stepped up."

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leads to sale price and net profit considerations, so important in competitive markets.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

SPECTROCHEMICAL ANALYSIS

IBM TESTS all incoming zinc-base die castings for trace elements, such as lead, tin, cadmium and magnesium. Much attention has been given to increasing the reproducibility and accuracy of such determinations, and to lessen the time required for each test. The equipment used, the technique, and the results obtained are all described herein.

PROBABLY there is no engineering material in use today that has closer limits in its analytical specification than zinc-base die casting metal. Experience has proved that there are certain metallic impurities which may be present in this metal in such amounts as to cause an intergranular corrosion to take place. Especially is this true when castings made from this metal are subjected to comparatively high temperatures and humidities.

When the impurities in this material are properly controlled, the castings made from it give an excellent account of themselves in service. No intergranular corrosion occurs and the castings are permanent in their dimensions. It is unfortunate that experience with the metal which was produced some years ago left a stigma which was hard to overcome. Today, under careful manufacturing control and with the aid of the spectrograph, tons of this material are being cast yearly. Thousands of zinc-base die castings are doing their part in our "World of Today" and will still be doing a good job in the "World of Tomorrow."

The elements which play havoc with zinc-base die casting metal and

the limiting amounts of those elements are: Lead, 0.007 per cent; tin, 0.005 per cent; cadmium, 0.005 per cent; and magnesium, between 0.02 and 0.10 per cent.

A few years ago it would have been thought impossible to control material to such close limits, and the chemists would have had great difficulty in making reliable analyses to determine such small quantities of impurities. When the demand arose for analytical methods to determine the impurities in zinc and its alloys which would be reliable, rapid and inexpensive, interest in spectrochemical analysis was given impetus. Prediction regarding the use of the spectroscope and its later form, the spectrograph, as a quantitative analytical instrument had been made. However, it remained for the actual

need for such methods to arise before much real work was done. Great credit is due to C. C. Nitchie, G. W. Standen and M. L. Fuller for the very excellent pioneer work they did in this field. Much is owed to them for the foundation of the methods that are being used today in the spectrochemical analyses of zinc.

The purpose of this article is to describe the procedure employed in the laboratories of the International Business Machines Corp. to increase the reproducibility and accuracy of spectrochemical determinations and to lessen the time required for such analyses.

A large Bausch & Lomb Littrow quartz spectrograph is used. The arc stand is inclosed in a sheet metal hood which is exhausted with a fan, as may

By K. J. MACKENZIE

International Business Machines Corp.,
Endicott, N. Y.

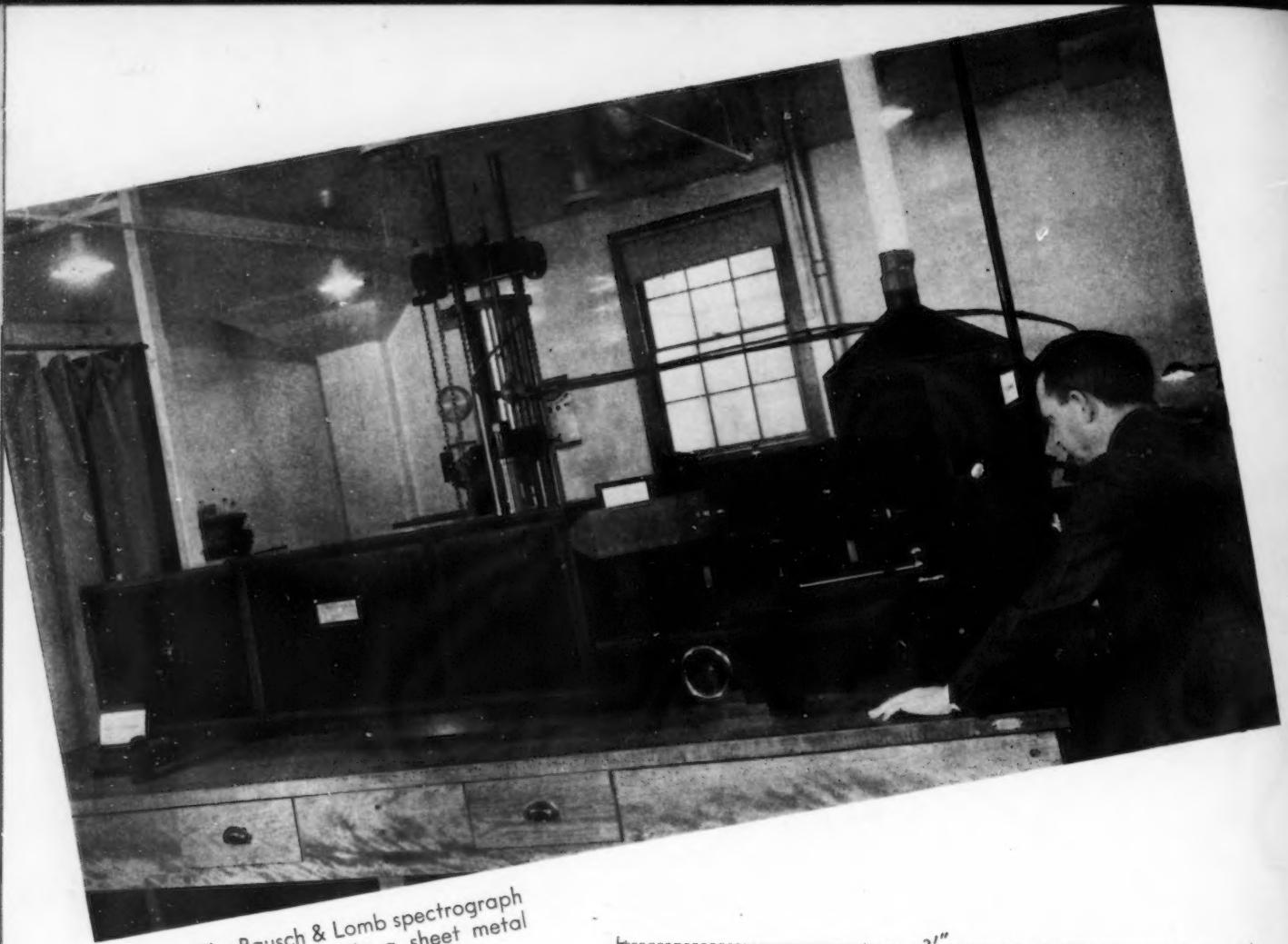
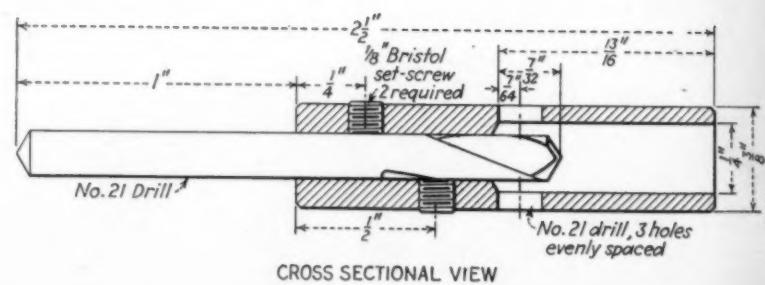


FIG. 1—The Bausch & Lomb spectrograph arc stand is inclosed in a sheet metal hood which is exhausted with a fan.

• • •

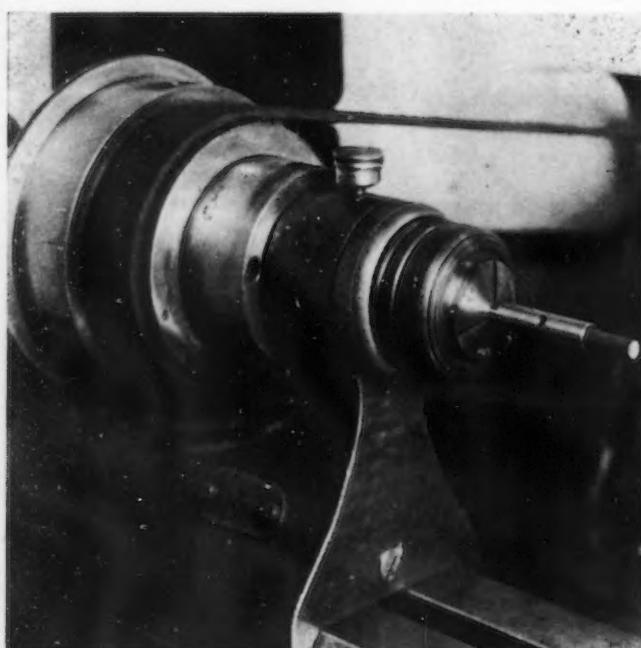
AT RIGHT

FIG. 2—Drill jig used for drilling spectrographic electrodes.



CROSS SECTIONAL VIEW

FULL VIEW



• • •

AT LEFT

FIG. 3 — Another view of the special fixture used to drill the spectrographic electrodes.

• • •

be seen in Fig. 1. The purpose of the hood is to screen the arc from the eyes of the operator and to prevent any possible pathological effect on the operator from breathing air contaminated by the volatilized samples. This danger is probably quite remote, but the precaution is well worth taking.

A sample is taken from each shipment of die castings received at the IBM plant. Millings are taken from the castings, care being exercised not to contaminate the sample. The millings are thoroughly mixed to insure a representative sample and 6.66 grams are taken for analysis. After solu-

tion in a 1-1 mixture of hydrochloric and nitric acids, the sample is made up to exactly 20 c.c. It is then ready to be added to the drilled crater of a specially prepared spectrographic graphite electrode.

The matter of selection of the proper sizes for electrodes is important as considerable wandering of the arc is caused when electrodes of too large diameter are used. This has been overcome in the IBM laboratories by the use of a $\frac{1}{4}$ -in. diameter electrode to hold the sample and an $\frac{1}{8}$ -in. diameter upper electrode which is sharpened in an ordinary pencil sharpener reserved for that purpose. The regular grade of spectrographic graphite electrodes is used and they are not pre-burned before using. They are supplied in 12-in. lengths and are cut to $1\frac{1}{2}$ -in. lengths for use. The $\frac{1}{4}$ -in. electrodes are drilled in one end to receive the sample, this being accomplished in the special fixture illustrated in Figs. 2 and 3.

Early in the work on spectrochemical analysis at the IBM Laboratories, it was realized that reproducibility of results was endangered by the absorption of the sample by the electrode. The porosity of the spectrographic electrodes is not uniform so the depth to which the sample is absorbed varies. The writer believes that this will give non-uniform results and the laboratory has overcome the trouble by the impregnation of the ends of the electrodes used to receive the samples with a solution of waxes.

Many spectroscopists using solution methods have employed various materials to overcome the absorption of the sample, among which are paraffin, mineral oil, collodion and others. It has been found that none of these worked well with the mixed acid solution at the comparatively high temperature at which the samples are dried. It was only after the trial of many solutions that one was found which effectively prevents the absorption of the zinc sample. The impregnant used in the IBM laboratories is a solution of 5 grams of Halowax No. 1014 and 5 grams white beeswax in 20 c.c. of C.P. carbon tetrachloride. Since this is a saturated solution at room temperature it must be kept at a slightly elevated temperature while it is added to the crater of the $\frac{1}{4}$ -in. electrodes. A batch of the electrodes to be impregnated is set up in a bakelite block and heated in a drying oven at 103 deg. C. (217.4 deg. F.) until the electrodes are thoroughly heated. Immediately after the block and electrodes are removed from the oven two drops of the

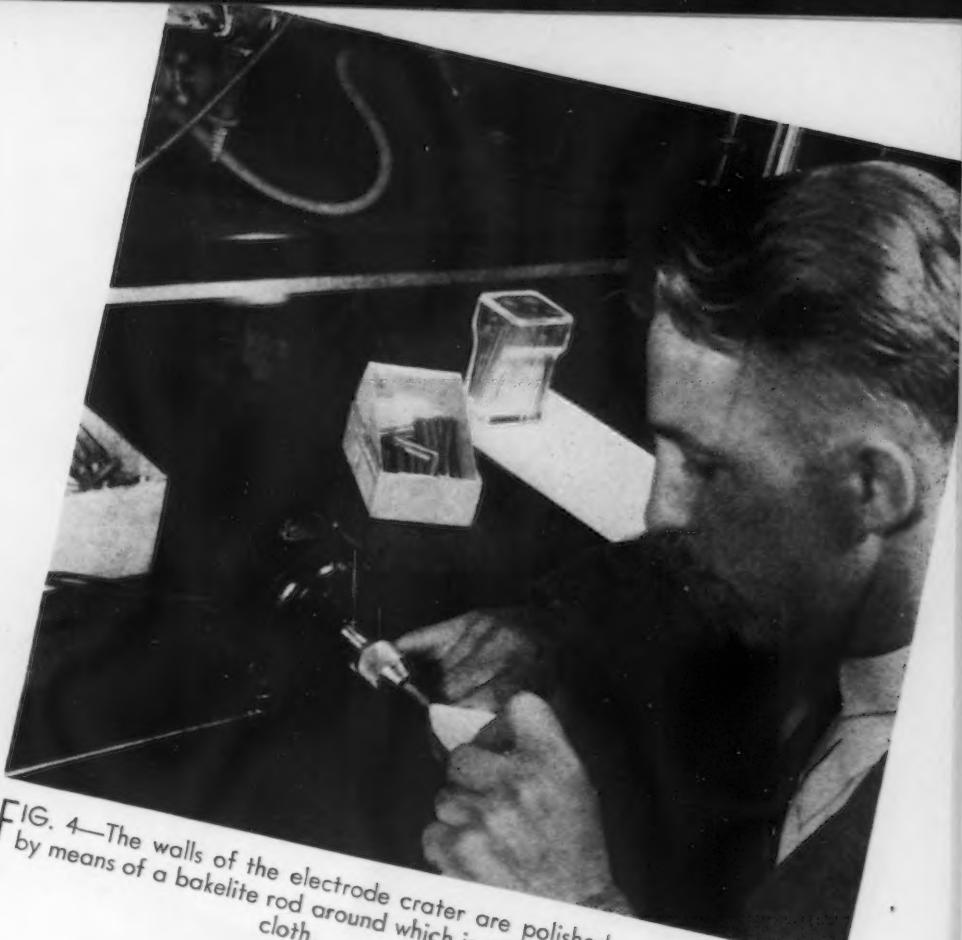


FIG. 4—The walls of the electrode crater are polished by means of a bakelite rod around which is wrapped a cloth.



FIG. 5—A sample is introduced in the electrode crater from the removable tip of a micro-pipette.

wax solution are added from a glass stirring rod to the crater of each electrode. The drops are added one at a time, allowing the first drop to soak in before adding the second. The second drop requires a minute or so to soak in and leaves a film of wax deposited on the walls of the crater. The excess wax is then removed and the walls of the crater polished by a piece of clean cloth wrapped around a bakelite rod of such diameter that, with the cloth wrapped around it, it can be pushed into the crater with ease. This operation is accomplished rapidly by

To prevent this creeping and mushrooming, ground graphite, prepared by grinding the regular $\frac{1}{4}$ -in. spectrographic graphite in the pencil sharpener is added to the crater in sufficient quantity so that, when tamped down with a glass stirring rod, it just fills the crater. It has been found best to use those particles of graphite which pass a 20 mesh screen, but not a 100 mesh. The ground graphite absorbs the sample, holding it in the crater by preventing the mushrooming and creeping.

Electrodes which have been pre-

pared in this manner are then ready to receive the sample. The sample is introduced to the electrode from the removable tip of a micro-pipette, as shown in Fig. 5. By confining the sample to the center of the electrode, the size of the sample used has been reduced from 0.1 c.c. to 0.05 c.c. This represents 0.0166 gram of the original metal. After the samples have been added to the electrodes, which are placed in the bakelite block, they are dried for at least 4 hr. in the drying oven at 103 deg. C. (217.4 deg. F.). It has been found convenient, as a matter of routine, to set up the samples late in the afternoon and allow them to dry overnight. In this way they are ready to be burned at the beginning of the next day with no lost time. Samples can be dried in less time if it

is found necessary to do so. As a matter of check all samples are set up in duplicate.

The drying oven is located adjacent to the spectrograph so that one electrode at a time can be conveniently removed. Since zinc salts are highly hygroscopic, it is found that the location of the oven is important as the samples rapidly absorb moisture from the air and would sputter in the arc. This causes loss of sample and at times will extinguish the arc if left outside the oven too long.

In burning the sample, the electrode is mounted in the lower clamp of the arc stand and an $\frac{1}{8}$ -in. upper electrode centered directly over it. Since the graphite which has absorbed the sample is more conductive than the rest of the electrode, the arc will center itself and will not start to wander until the sample is completely burned. Instead of having to burn for 3 min. with a sector disk interposed in the path of the light to prevent the build-up of background and the attendant loss of sensitivity, the sample is completely burned in 30 sec. using all the light. For the first 10 sec. of the burning period, 8 amp. are used. During this time the more volatile elements such as tin, lead, and cadmium are completely volatilized. At the end of this period the current is increased to 15 amp. The more refractory elements such as magnesium, aluminum, copper and silicon are removed in this fraction. As the sample is consumed the current drops back to 13 amp. This is generally accomplished in 20 to 25 sec., but all samples are burned in 30 sec. total time to insure the complete removal of all elements. When a large number of samples are burned daily, considerable saving of time can be accomplished by burning only 30 sec., compared with the 3 min. burning required by older methods.

The "go"—"no go" method of quantitative estimation is used. Spectra of standard samples containing the minimum and maximum magnesium content with the maximum of the impurities, lead, tin, cadmium and iron are photographed on the same plate with routine samples. The middle range of the spectrograph is used which includes that portion of the spectrum from 2550 to 3550 Angstroms. The lines used for comparison for the various elements are as follows: Magnesium, the five magnesium lines from 2776.71 to 2782.99 inclusive; iron, 2823.28 and 2825.56; copper, 2824.38; lead, 2833.07; tin, 2839.99 and 3262.33; cadmium, 3261.05. In this way all of

(CONCLUDED ON PAGE 66)



FIG. 6—After the plates are processed and dried they are examined in this type of viewing box.

mounting the electrode in a chuck on the spindle of a small motor and pressing the polishing cloth into the crater of the electrode, as shown in Fig. 4.

Electrodes prepared in this manner prevent the absorption of the sample very effectively, but unless further precaution is taken trouble may be encountered. It is well known that zinc salts creep when precipitated out of solution. It was discovered that this characteristic was detrimental; for when the sample was confined to the crater, in the subsequent drying operation as the zinc salts precipitated out, they crept up over the edge of the crater and often down the side of the electrode. They also would mushroom up out of the crater and, later, when the arc was struck part of the sample would be lost.



ACME LABORATORY IS

THE metallurgical department of the Acme Steel Co., Chicago, which not only furnishes technical information regarding various types of metals, but also coordinates the customer, the sales department, the planning department and the mill itself, is well quartered in 6260 sq. ft. of new laboratory space built in January last year at the Riverdale, Ill., plant, at a cost of nearly \$32,000.

Aside from its physical and chemical testing functions which are carried out in laboratories containing the best available equipment, Acme's metallurgical staff under the supervision of R. F. Main, chief metallurgist since 1924, goes a step further and actually acts as an intermediary, or "go-between" for the mill and the customer, and the mill and its supplier.

In the first place, all of Acme's slabs and billets are purchased on the outside. In cooperation with its sources of supply, therefore, specification systems have been drawn up, so that the metallurgical men at all times know exactly the composition of the steel that comes into the plant. Records are kept of every heat and its analysis, and of every slab or billet in each heat; thus, errors in filling orders are unlikely and are easily checked when they do occur.

The Acme metallurgists employ

cameras and their own dark room to good advantage by photographing samples of the various products for which the company is supplying steel. In this way a record is easily maintained of the finished piece, while the original can be cut and analyzed or otherwise tested. Some of these photographs on file date back to 1924 and still represent items continuously supplied. Thus the proper type steel can be recommended, on the basis of which a specification data sheet is made out, containing laboratory observations and customer's specifications or instructions. The laboratory then specifies on these data sheets the type of strip, the temper, edge, finish, steel specification, coating, tolerance promised or to be furnished and any special mill practices which may be required.

In this manner the metallurgical office records all data pertaining to every single item ordered by Acme's many customers. By means of a teletype hook-up between the metallurgical department, the hot mill and the main office of the company in Chicago, a constant close check is maintained at

THREE views of Acme's new air-conditioned metallurgical offices. In upper left is the general office where specification data sheets are filed. The physical testing laboratory is pictured at the upper right, while at the bottom is the chemical section.

"GO-BETWEEN"

all times. Every order received at the main office or starting through the hot mill is checked against the files in the laboratory. If the specifications differ the order is questioned and held up until approval is obtained.

As an example of this system, a customer orders hot-rolled Acme Superstrip, 4½ in. x 0.083 in. x 103 in. When checked with the customer's file, it is learned that this customer has been buying the same size steel for some time, but 108 in. long. Suspicion is aroused because of the similarity of the two orders except in the length. A check is immediately made, after holding the order, and the sales department questions the buyer. It is discovered finally that the 103 in. length was an error and that 108 in., as filed on the customer's card, is the correct length.

Situated in a new air conditioned building, which also houses the plant offices, restaurant, and recreation facilities, Acme's metallurgical laboratory is well equipped to handle the ever increasing number of duties that the metallurgists are being asked to perform.

FUELS

for the Iron

IN the iron and steel industry, considered as a whole, fuel is required for a number of purposes classifiable under two main heads, (a) for power production, and (b) as a source of heat.

In many industries these two purposes must be regarded as absolutely distinct, but in certain of the larger iron and steel works the distinction is less evident, such as when waste heat, or waste potential heat, is available from metallurgical and allied operations. In smaller plants the distinction still remains and is necessary, especially as part or the whole of the power requirements may be purchased from outside. By far the greater proportion of the fuel, however, is used in supplying heat for metallurgical and allied operations. In fact, in a unified works comprising coke ovens, ore treatment plant, blast furnaces, melting shop and mill, the whole of the fuel requirements for power can be supplied by the surplus coke oven gas, blast furnace gas and waste heat from the melting shop.

Fuel in general may be solid, liquid or gaseous, and each type has its own particular sphere of most efficient usefulness. Each has its own advantages and disadvantages, but for many purposes gas is often the best and most convenient especially, because all fuels must be gasified before they can be burned with the production of a flame. Combustible gas, therefore, is one step ahead in the combustion process of solid or liquid fuels.

Some processes in a plant, as for instance reheating, heat-treatment, forge and similar furnaces, offer a wide range for selection of fuel. Others offer only a limited range, as for example the blast furnace which requires a solid fuel.

*Abstract of lecture presented before the Staffordshire Iron and Steel Industry, Birmingham, England.

For best results and economy a fuel for the former furnaces should possess the following desirable attributes:

- (a) It should be easily distributable.
- (b) Its combustion should be easily controllable from the points of view of atmosphere, temperature and flame length.
- (c) It should be free from constituents harmful to the charge.
- (d) It should be capable of high thermal efficiency and give a flame temperature adequate for the particular purpose.
- (e) It should be capable of easy storage.

In view of these attributes, the inverse order of suitability of general fuels for this purpose is—coal, pulverized fuel, fuel oils and gas.

Coal Cheapest

Selection, however, is complicated by such factors as price, availability, etc., and it must always be remembered that when secondary fuels, that is tar, tar oils and gas are prepared from coal, part of the heat available from the original coal has to be used directly or indirectly in supplying the heat required for the conversion of the coal to the secondary fuel.

As far as price per thermal unit in the original fuel is concerned, coal will always be the cheapest fuel in Great Britain, but it possesses serious disadvantages for ordinary metallurgical work. Among the disadvantages are:

(a) It is not a uniform fuel, chemically or physically.

(b) It possesses varying proportions of non-volatile incombustible matter which can seriously affect its burning properties.

(c) It has to be conveyed to the furnace, and after burning, the ash and cinder have to be removed and disposed of.

(d) It is difficult to control its combustion to cope with rapid changes in demand or alter the condition and nature of the flame.

(e) The ash, some of which finds its way into the burning gases, may harm the charge.

(f) The smoke produced during periods of incomplete combustion may constitute a nuisance which may also be aggravated by the presence of small particles of ash.

(g) Many coals deteriorate on storage.

The advantages of coal, however, are as follow:

(a) It is the cheapest form of available fuel.

(b) It can easily be stored without special provision of expensive containers.

(c) In using a primary fuel such as coal the furnace is not so dependent upon the working of an ancillary plant as in the case, for example, of producer gas.

Some of the disadvantages of raw coal may be overcome by the use of pulverized fuel. With the unit system of pulverized fuel firing usually adopt-

and Steel Industry*

By S. G. WARD, D.Sc.

ed, where each furnace has its own pulverizer and feeder¹, the disadvantage of bringing the fuel to the furnace still holds, and in many cases the ash problem still exists. Combustion, however, is more easily controlled. The development of pulverized fuel firing for metallurgical furnaces is probably the most interesting and important development during the last 15 years in this particular section of the industry, giving rise to a flexible solid fuel, the flexibility being obtained at the expense of grinding only and not by gasification.

Liquid fuels in certain cases have several advantages over coal as they are fairly easy to handle. In Great Britain, at present, they are expensive. With certain mineral oils the ash present may have undesirable properties and adventitious dirt may choke filters and burners. With tar, bad combustion may lead to formation of coke near the burners. The practice of atomizing the oil with steam, while giving desirable combustion characteristics to the oil-air mixture and also to the flame, leads to a reduction in

¹ Recent American installations use a central pulverizer and distributing piping system. See "Pulverized Coal for Metallurgical Furnaces," by C. F. Herington, THE IRON AGE, Jan. 19, Feb. 2, 1939.—Ed.

overall efficiency, and, of course, requires a supply of cheap steam.

Gaseous fuels for metallurgical furnaces are ideal from the combustion point of view and from other points of view, especially convenience. Among the advantages of gaseous fuels may be mentioned the following:

(a) The fuel may be prepared from coal at a central preparation plant and distributed to each gas burning unit.

(b) The gas can, if necessary, be purified from undesirable constituents and so give a fuel unlikely to damage the charge and with little distribution difficulty.

(c) Gas burns without giving rise to some of the troubles experienced with oil, coal or pulverized fuel, the ash problem is absent, burners are not likely to be clogged, etc.

(d) The burning of gas is amenable to easy control from the point of view of changes in temperature, changes in demand, nature of the atmosphere and length of flame.

(e) Where high temperatures are required, better thermal efficiencies can be obtained than with solid or liquid fuels as the incoming gas can be preheated by regeneration or recuperation of much of the heat in the waste gases.

(f) When properly prepared, gas is much more uniform in composition than the parent coal.

The disadvantages of gaseous fuels are, inter alia:

(a) They are more expensive than

coal, except where surplus fuel gas is available to such an extent that it can be credited to the producing plant only at its coal-replacement value.

(b) In some cases where storage of the fuel gas is necessary, its storage becomes a problem because of the large volume occupied.

Characteristics Rule Selection

The selection of fuel for use in a metallurgical furnace, controlled in the first place by the operation taking place within the furnace, involves a knowledge of the combustion characteristics of the available fuel. Important properties in this direction are: (a) ignition temperature, (b) limits of inflammability, (c) rate of flame propagation, and (d) flame temperature, together with radiation from the flame and character of the flame.

IGNITION TEMPERATURE: Whatever the fuel, whether solid, liquid or gas, combustion cannot occur until the fuel has been heated to a certain minimum temperature, characteristic of the fuel. In other words, the temperature at which heat is generated by burning faster than it is transferred to the surroundings. Ignition temperatures in air at atmospheric pressures for gases of commercial significance are as follows:

Hydrogen, 1075 to 1095 deg. F.
Carbon monoxide, 1195 to 1210 deg. F.

Methane, 1031 to 1290 deg. F.

Moisture usually raises the ignition temperatures.

LIMITS OF INFLAMMABILITY: For each fuel gas there are definite upper and lower limits of composition of the gas-air mixture beyond which the mixture will not ignite and continue to burn. The limits vary with the gas, the temperature and pressure. For the gases involved in ordinary industrial heating, at ordinary temperatures and

atmospheric pressure, the limits are as follow:

Hydrogen, 6.2 to 71.2 per cent.
Carbon monoxide, 16.3 to 71.4 per cent.
Methane, 5.8 to 13.3 per cent.

The gas-air mixture therefore, must be within the limits of inflammability and must be heated to a certain minimum temperature before combustion can occur.

RATE OF FLAME PROPAGATION: This is important, especially in the design of burners and furnaces, since the gas velocity entering the furnace must be greater than the flame velocity, otherwise back-firing will occur. Flame speed varies with the gas-air proportions and with the diameter of the tube or vessel in which the flame is produced.

FLAME TEMPERATURE: At present there does not exist a satisfactory method of measuring the temperature of a flame. For comparison purposes the so-called theoretical flame temperature is used. Flame temperatures of gases of industrial significance are, in air, as follow:

Hydrogen, 3934 deg. F.
Carbon monoxide, 3934 deg. F.
Methane, 3722 deg. F.

The theoretical flame temperature can be increased by preheating the incoming air and/or gas. If the air is preheated to 1112 deg. F., the value is increased from 3934 deg. to about 4712 deg. F., and if both the air and the gas are preheated to 1112 deg. F., the theoretical flame temperature is increased to 5072 deg. F. The flame temperature is affected also by excess air, moisture content of the air, etc.

The burning of raw coal takes place in at least three stages, namely distillation of volatile constituents from the green coal, burning of the volatile matter, and burning of the so-called fixed carbon. Except, therefore, in furnaces fired mechanically with well-sized coal, there is lack of uniformity in the fuel bed, in the draught distribution in the excess air, in the flame condition and properties, etc. Where additional expense is warranted a suitable gaseous fuel is more convenient.

Coke oven gas and town's gas are obtained by destructive distillation of coal and are very similar in most respects. When prepared, they represent only a small proportion of the original coal, the major yield being coke. Accordingly, as far as their application to furnace heating is concerned, they are useful only when a supply is available from, for example, coke works

where coke is being prepared for metallurgical purposes.

Producer gas is the most popular gaseous fuel in the iron and steel industry, especially in isolated plants, being obtained by the regulated partial combustion of suitable coals in a cylindrical producer. Coke may be used instead of coal but the former gives a gas of lower calorific value than that obtained with mechanical coal producers.

Water gas obtained by the application of steam on red-hot coke is not much used for furnace heating, although it finds useful application for certain types of welding.

Blast furnace gas, when available, offers a useful fuel for certain types of work where a very high flame temperature is not required.

The fuels of greatest interest to the iron and steel industry as a whole are, therefore, coal, coke, coke oven gas, producer gas and blast furnace gas. The selection of a fuel for a particular operation is governed (a) by the operation itself, and (b) by the availability of the fuels.

For convenience the fuel consuming units of the industry may be divided up into the following categories:

- (a) Coke ovens for preparing solid fuel, for
- (b) the blast furnace.
- (c) Melting furnaces requiring temperatures above 2912 deg. F.
- (d) Reheating and treatment furnaces where lower temperatures are required.

Fuel for Coke Ovens

At coke ovens situated at collieries the usual fuel is neat coke oven gas distilled from the coal. In such cases in a modern plant, less than 40 per cent of the total make of gas is required for heating the ovens, leaving over 60 per cent available for other purposes. The flue temperature required in coke oven work seldom exceeds 2192 deg. F., and such temperatures can easily be attained with gas of lower calorific value and intensity than coke oven gas. Where as use or a market exists for the higher calorific gas, it is a waste of good material to use it to heat the ovens. Accordingly, if lower calorific value gas is available, it is often good policy to have the oven heating system so designed that either low or high heating power gas can be used efficiently.

Blast furnace gas, of calorific value of around 100 B.t.u. per cu. ft., is, if preheated in addition to preheating the air, a suitable fuel for coke oven heating and its use on plants attached to ironworks is increasing. In such cases

the whole of the make of coke oven gas is available for melting shop work, etc., where, mixed with blast furnace gas, it forms a useful substitute for coal producer gas. Producer gas made from breeze screened from the coke affords a further low heating value for coke ovens. Such producer gas heating does not appear to be very popular in Great Britain for coke ovens, although it is often applied at gas works for heating the gas retort settings. The use of low calorific value gas for coke oven heating has, of course, certain disadvantages, due first of all to the low heating power of the gas which, as well as the air, has to be preheated before combustion in order to give the necessary flue temperature, necessitates special design of regenerators and flues; and, secondly, to the large volume of fuel gas and flue gas to be dealt with.

Gas Mains Vary

An important point in connection with the use of low calorific power gas is the size of the gas mains to be employed. Coke oven gas, for example, contains about four and one-half times as many heat units as an equal volume of blast furnace gas. The specific gravity of blast furnace gas is about twice that of coke oven gas. Therefore, the friction loss in the flow of equal volumes is about two and one-half times as much for blast furnace gas as it is for coke oven gas. That is, for equal volumes a blast furnace gas main must be about 50 per cent greater in diameter than for coke oven gas, and for equal units of heat the blast furnace gas main must have a diameter about two and one-half times that of the coke oven gas main. Accordingly, blast furnace gas should be used as near to the blast furnaces as possible and handled as little as possible.

The blast furnace plant, in addition to requiring fuel for the furnaces themselves, requires a certain amount of fuel in the treatment and preparation plant of the in-going ore. The blast furnace plant proper is a greedy plant as far as fuel is concerned. Depending upon the burden, and to a certain extent upon the coke itself, the blast furnace requires anything from 1600 to 1800 to 3000 lb. of coke per ton of iron made. The actual coke consumption depends upon many factors, some of which are as follow:

- (a) The coke itself, that is its physical composition, chemical composition, etc.
- (b) The composition of the burden.
- (c) The grade of iron being produced.
- (d) The type of slag required.
- (e) The size of the materials charged.

(f) The size uniformity of the materials charged.

(g) The size distribution of the materials within the furnace as controlled by (e) and (f).

(h) Order of charging the coke and ore.

(i) Temperature, pressure and humidity of the blast.

(j) Furnace design.

(k) Weather and wind direction.

(l) Condition of the furnace.

(m) Personal factors, among which may be mentioned the manager's convictions as to the best method of handling the furnace, and the experience of the furnacemen.

Blast Furnace Combustion Poor

Considered as a separate unit, the blast furnace has poor combustion efficiency in that the waste gases are combustible. The better the furnace is working the lower the proportion of combustible gas in the top gases. There is a limit, however, to the ratio of CO_2/CO obtainable in the top gases and the limit at any given time is governed by the dynamic chemical equilibria obtainable within the stack under the running conditions. On the other hand, the top gases, which should leave a furnace which is working well at around 212 deg. F., can be put to good use on a properly coordinated works and are not wasted, and with the potential heat recovered from the gases by using them as a fuel, the blast furnace becomes an efficient unit from the combustion engineer's point of view.

Melting furnaces require a fuel of high flame temperature. In many works, probably most works, the fuel gas on open hearth furnaces is producer gas made from suitable coals, the gas being used hot and without de-tarring. There is a tendency, where convenient, of replacing producer gas by a suitable mixture of blast furnace gas and coke oven gas. The gas on a unified works may be obtained from the coke ovens, or may be purchased in certain districts from neighboring coke oven plants. A changeover from coal producer gas to coke oven-blast furnace gas mixture sometimes leads to trouble, especially with burned roofs, due to the different combustion characteristics of the mixture from producer gas.

Ordinary reheating and other similar types of metallurgical furnaces do not require fuels with such high flame temperatures. Accordingly, practically any fuel may be used if suitably applied. At many mills, situated at more or less unified works, blast furnace gas is used as a cheap and convenient fuel for soaking pits, reheating and annealing furnaces. At mills and

works not attached to large works, coal, coke oven gas, producer gas, tar oils, fuel oils and pulverized fuel may be used. Such fuels may, of course, also be used even at unified works and there is one works where, when coke ovens were closed down, some of the metallurgical furnaces were heated by means of producer gas, some by blast furnace gas, some by fuel oil, and others by pulverized fuel.

In some sections of metallurgy electrically heated furnaces are used.

It is the object of all within the iron and steel industry to produce the best product at the lowest price, and everyone engaged in the industry is, directly or indirectly, striving to reduce production costs. Fuel costs form a very large item in iron and steel metallurgy, and it is often toward fuel that attention is turned for reduction of costs. The possible saving in fuel has of course been recognized almost since the inception of the industry and has crystallized into fuel economy.

Fuel economy in the first place is bound up, not so much in tracing small leakages of heat, but in intelligent selection and use of fuel and burning appliances. Where selection of fuel and burning appliances is limited, then fuel economy becomes a question of the best use of the available fuel under existing circumstances.

In an industry such as the iron and steel industry, fuel economy concerns not only each unit and each process but also coordination between the different types of plant and processes employed, even when they are not on the same site. Most of the coal used by the iron and steel industry is for the making of coke for use in blast furnaces. Fuel economy and conservation, therefore, effected at the blast furnace will be reflected in all iron and steel products. The average coke consumption per ton of iron made has decreased during the last 15 years, but there is still room for considerable improvement.

Ash Is Removed

But fuel economy at the blast furnace does not begin at home—it begins at the coal mine and in the ore mine. Not so very long ago coke ovens formed a sort of convenient refuse destructor where unwanted coking duff, screened from the much more easily saleable and valuable larger coal, could be converted into saleable coke for blast furnace use. In those days the duff was not washed before carbonization and the resulting cokes contained high proportions of ash. The practice of washing such duff before coking is

now almost universally applied, but it is only comparatively recently that the practice has become general.

Colliery slacks, before washing, may contain anything up to 20 per cent ash and sometimes more. These slacks may be washed and the size most suited to coking may be washed down to around 6 per cent of ash or lower, but is seldom cleaned below 5 per cent. The corresponding large coals from which the coking duff has been screened often contain much less than 5 per cent ash, and it is a pity that the industry cannot afford to use the cleaner large coals. It might be worth the industry's consideration, however, to produce a still cleaner coking duff by rewashing to give two products—first a super-clean duff for producing low ash coke and second, a somewhat higher ash material suitable for use under boilers. Modern research in coal cleaning is gradually introducing more efficient washing, but it must be pointed out that the degree of cleanliness or freedom from mineral matter obtainable is a function of the ash distribution within the coal itself, and some coals are much more difficult to wash than others.

Ash Cost Is High

It can be shown that, with a coke consumption around 2500 lb. per ton of pig, an additional one per cent of ash increases the coke consumption by up to about 50 lb. per ton, involving a direct increase in production costs of around 12c. per ton. But the extra ash in the coke necessitates extra fluxing materials, thus reducing the amount of iron in the burden, causing reduction in furnace capacity, reduction of output increase in slag formation and therefore greater volume of slag to be handled, increased transport and handling costs for coke and, usually, lowering in the quality of the iron. It is difficult to assess the extra cost thus involved but it will probably be around 18c. per ton. One per cent extra ash in the coke, therefore, involves an increase in cost of iron production of about 31c. per ton. Conversely, a reduction of one per cent in the ash content of the coke would lead to a reduction in cost of iron production amounting to 31c. per ton.

If coke quality varies so much that the ash content varies from 7 per cent to over 12 per cent, then using the dirtier coke, the cost of iron production will be at least \$1.50 per ton more than with cleaner coke. This does not take into account the effect of the moisture in the coke.

The smooth running of the blast

furnace not only determines to a large extent the overall fuel economy of iron and steel production, but also influences the cost of semi-finished and finished products. Smoothness of running the blast furnace is almost always reflected in coke consumption. For best results, as far as the coke is concerned, the washeries and the coke ovens should by their combined efforts provide the blast furnace with the best possible coke.

Unsized Ore Used

The road to fuel economy can often be indicated by an examination of the process or plant from a point of view not directly associated with the fuel itself. The blast furnace provides a useful example, but the general idea can be applied to all metallurgical operations.

The ore charged into the furnace has a very important effect on the fuel consumption of the furnace. In many districts the ore charged is wet—it may or may not be broken. Even on works where the ore is broken, it is unusual, in Great Britain, for the whole of the ore to be so treated, and it is no uncommon sight to see pieces of ore weighing over 100 lb. being charged into a furnace. Where unsized ore and coke are used, segregation is bound to occur within the furnace. The amount of segregation as well as the ultimate distribution will be dependent to a certain extent upon the method of handling the materials before they reach the bell. The ordinary bell, however, seems to exert the greatest influence on the ultimate distribution which would depend upon, among other things, the bell diameter, throat diameter, angle of bell, bell-drop, distance from bottom of bell to top of stock, amount of material on the bell, order of deposition of coke and ore on the bell and the shape of the interior of the furnace top.

Ore Moisture Expensive

Where there is mal-distribution of stock as far as size and also chemical composition is concerned, gas-stock contact-times will vary across any given plane. This is reflected in gas compositions and temperatures.

If the gases in any blast furnace stack are fully utilized there is no reason at all why top gases with CO/CO_2 ratios of below 2, should not regularly be obtained together with a very marked decrease in coke consumption. This can only be attained by uniform distribution of the materials within the stack, or possibly by a very tall stack.



THE smooth running of the blast furnace not only determines the fuel economy but also influences the cost of semi-finished and finished products. If possible some degree of drying of the ore prior to charging is beneficial.

Haematite Sales Co., Ltd.

But tall stacks have not been successful. If the ores and coke are charged with a wide size range, then attention to charging devices and design of the furnace top might insure better size distribution within the furnace. Such a step, however, would only be a palliative, the real cure is to break the ore, screen out the fines, and charge only sized material. Incidentally, the practice of charging unduly large pieces of scrap or shoddy is not likely to improve furnace working.

The question of the moisture in the ore charged does not appear to have received due attention. Where the ores have to be conveyed by rail long

distances, it seems pointless to carry with the ore, as often occurs, large quantities of water. From the point of view of transport alone, the actual ore capacity of cars is reduced and freight charges on water are the same as those on ore, and literally thousands of dollars are being spent annually in carrying water entangled with ores from the mines to the furnaces. Wet ores cause trouble in storage bins and hoppers, in breakers and on screens, on the furnace bell, etc. They lead to the production of wet top gases and they are responsible for high hydrogen-content in the top gas with corresponding loss of coke. As a pallia-



Large extent the overall fuel economy of iron and steel production, smoothness of operation requires the best possible coke, sized ore, charging stack. Photo shows a furnace being tapped at the plant of Barrow ematite Ltd., England.

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ive in this direction, breaking of the stone may help, since the water reaching zones hot enough for the steam-carbon reaction to occur must have been retained in the larger lumps of ore. If such lumps burst in hot zones, then there will be a local high concentration of hydrogen. Breaking the stone, however, is far from the complete answer, although it would also help in that size distribution would be better, because with bad size distribution a lump descending the furnace might suddenly go from a zone at 750 deg. F., to a zone at 1500 deg. F. Sudden divergence of a very hot gas stream passing through zones consist-

ing mainly of the larger pieces of burden to cooler zones where the smaller sizes preponderate would account for very rapid alterations in temperature at one point, and also, to a certain extent, to the incidence of the water-gas reaction.

Partial Drying Suggested

The cure is to dry the ores, partially at any rate, before charging them into the furnace. Blast furnace gas could be used for this purpose, or possibly flue gases from the combustion of low grade coal.

For best working of a blast furnace, regularity and uniformity of raw ma-

terials would seem to be more than highly desirable, but few blast furnace operators are blessed with such uniformity. Coal treatment is now practiced with benefit both to supplier and user. Ore treatment is practiced before metallurgical treatment of minerals other than iron ores, but the lower value of iron ores, especially the low grade ores found in Great Britain, seems to have deterred producers from spending much money on their treatment. This is a mistake, for every penny spent on ore treatment outside the blast furnace, 4c. would be saved within the furnace, apart from subsequent savings in other parts of the works, because uniformity of product from the blast furnace will reduce steel making costs and probably also rolling costs, especially from the point of view of defectives.

For fuel economy in any plant, it is necessary to know exactly what is happening so that losses of heat and efficiency may be checked as soon as they arise. This calls for the provision of adequate recording instruments, for without their aid fuel and efficiency losses occur without detection. Provision of instruments always eventually leads to reduction in defective material as they afford a means of process control as well as control of process conditions.

Coal is a mainstay of the iron and steel industry. Nationally, as well as industrially, it should be used to the best advantage of all concerned, whether as coal, coke or gas.

Managers of the various units of iron and steel works have as much as they can do to keep their respective units working satisfactorily—they have not the time they would like to devote to the problem of fuel economy and fuel conservation on their own particular unit. Accordingly time has seen the gradual introduction of separate fuel departments whose job it is to keep an eye on fuel consumption, to suggest where savings can be made, to coordinate fuel usage between departments, etc. It is submitted that the industry would benefit considerably by the introduction of a greater number of people who have received first class training in fuel technology, which includes the proper study not only of the application of coal, coke and gas to the country's industrial needs, but also training in the fundamentals of use of all solid, liquid and gaseous fuels. Fuel economy in any works cannot be efficiently attained without the aid of properly trained men.

ELECTRICITY'S ROLE IN

BY F. MOHLER
General Electric Co.

THE modern mill is not a conglomeration of isolated units slapped together and a roof built over it. It is a highly coordinated precision machine. Its success depends upon the uninterrupted flow of steel through it, and the utmost in coordination is required between operating departments, mill builder, electrical manufacturer, building designers, constructors, and the myriads of contractors supplying lesser parts of the equipment, if the result is to be satisfactory. Changes after completion today, more than ever before, are costly. Everything must be planned, from the location of the largest mill housing, to that of the smallest control switch.

It is natural, therefore, that steel's most modern hot strip mill, the new Irvin works of the Carnegie-Illinois Steel Corp., should present an interesting study. It is a triumph in modern engineering and construction. It is not "just another hot strip mill," but presents many interesting features.

First, it is unique in that a country-side hill was chiselled out and a mill was built "from the ground up." Next, its gigantic size presented new and interesting problems, and the careful layout and perfection of detail also bear consideration. Then, the degree to which equipment was completely assembled at the factory presents a new phase in modern construction. Last, but not least, safety to men and equipment has been given the utmost attention.

The main drive motors, totalling 42,250 hp., represent the greatest

In this description of the electrical equipment for the 80-in. Irvin continuous mill, the writer brings out three points: The vast amount of intricate engineering that preceded the first step of construction, most of the results of which are invisible to the casual observer; the unprecedented extent to which factory assembly was used for the vital equipment above and below stairs; and the inspiring greatness of this producing unit—a symphony of power under iron-hand-in-velvet-glove control.

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power ever applied to a hot strip mill. A total of 15,250 hp. in 6600 volt, 60 cycle slip ring (wound-rotor) induction motors drives the first scale breaker and four roughing stands of this 80-in. wide mill, and the accompanying table shows the motor ratings, gear ratios, speeds, etc. The roughing stands are so placed that the largest slab can only be in one stand at a time, making it unnecessary to synchronize these drives.

The six finishing stands are set on 18-ft. centers, and are driven by 27,000 hp. in adjustable speed 600 volt d.c. motors. For details, see accompanying table. Each motor is designed for 1½ per cent speed regulation from no-load to full load throughout its respective speed range, and has a maximum load rating of 200 per cent at top speed, with the exception of No. 10 stand, which has a maximum load rating of 240 per cent at top speed. The delivery

speed from stand No. 10 is 1005 to 2010 ft. per min. Nominal annual production is 600,000 tons.

Power for the finishing stand drives is furnished by three 7000-kw., 600 volt motor generator sets, which are the largest ever supplied for a hot strip mill. Each set, which consists of two 3500-kw. generators, driven by a 9600-hp., 6600 volt synchronous motor at 360 r.p.m., is designed for 200 per cent maximum loads.

The operators control the main drives from two elevated pulpits, overlooking the operating side of the mill—one at the roughing end, and one at the finishing end. Not only has great care been used in the location and design of these pulpits so that the operators have clear and uninterrupted view of the mill, but equal care has been used in locating every control switch and instrument for the convenience and natural motions of the

THE IRVIN WORKS...

operator. The control bench boards or desks are as narrow as possible, so the operator does not have far to move to reach any switch or to read any instrument.

The switches and instruments are arranged in the same sequence as the mill. Those used most frequently are in the handiest positions. Every control function necessary for the operation of the mill is at the operator's finger-tips, but unnecessary functions have been eliminated to prevent confusion. All set-up switching is performed in the motor room by means of permissive control switches which, when thrown to the proper positions, not only allow the mill operators to manipulate the mill at will, but, by means of indicating lights, tell them the set-up, and that they have control.

Edgers Reversible

The edging rolls used with roughing stands No. 2, 3, and 4, are each driven by a 200 hp., 450 to 900 r.p.m., 230 volt,

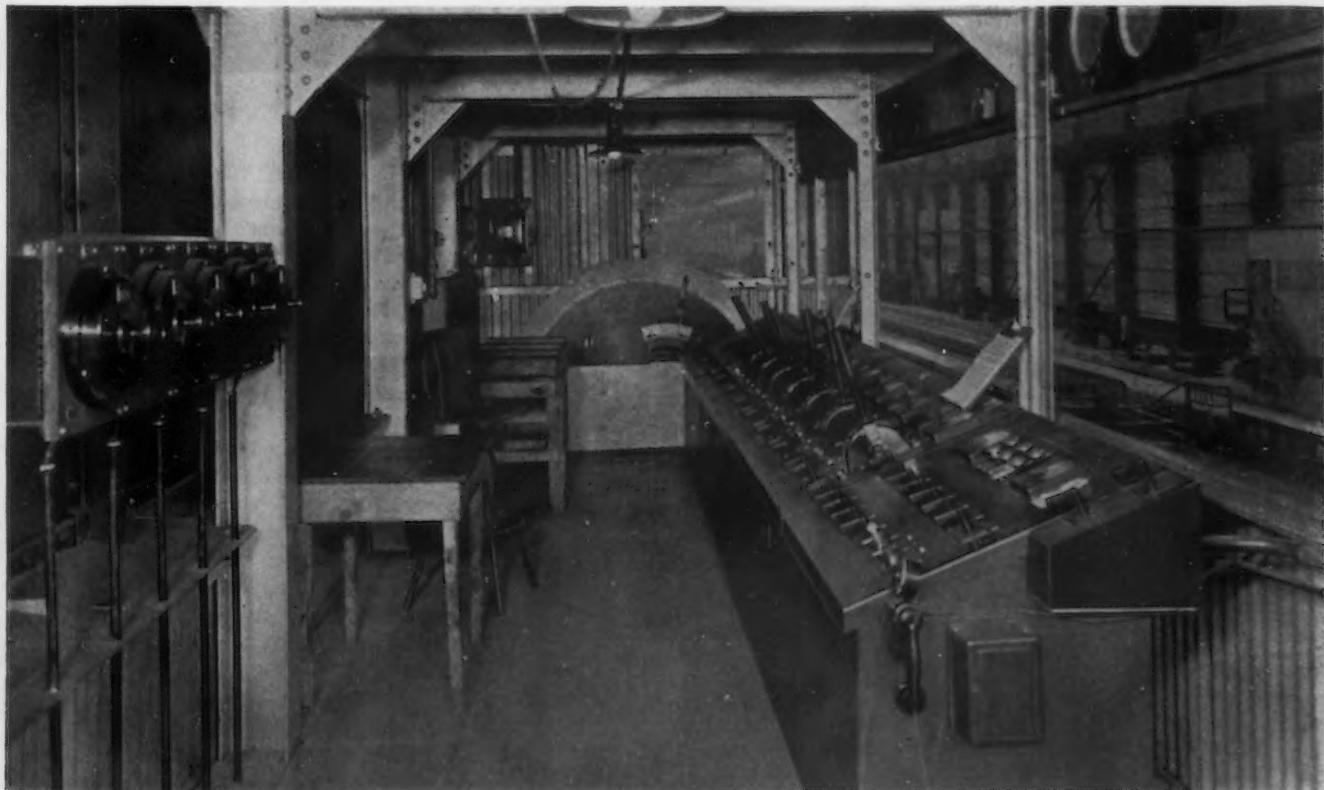
mill type d.c. motor, provided with rheostatic or magnetic control. The control switches and instruments for these drives are combined with the respective main drive control on the roughing mill bench board. All roughing mill drives, including the edgers, are provided with emergency reversing features, in order to back out a possible cobble without loss of time. Speed indicators, ammeters, motor operated rheostats, and proper motor compounding make it possible to synchronize the edgers with the main rolls, so that they neither try to push nor pull the slab through the main rolls, for this would, of course, severely overload the smaller driving motors.

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FIG. 1—Finishing mill control bench board.

In the finishing mill pulpit (Fig. 1), ammeters, speed indicators, motor operated coarse rheostats, and lever operated vernier rheostats, make it possible for the operator to set up for any schedule quickly and synchronize the drives when rolling. Close speed regulation of the motors, and accurate control reduce rolling adjustments to a minimum. Any individual motor, or all motors and their generators simultaneously, can be tripped on emergency. Proper control makes it possible for a good operator to stop a stand, snap off the strip, and pile it between selected stands in case of trouble. This saves many rolls.

Ordinarily, all finishing mill motors and generators are connected in parallel to one bus. However, the control is so arranged that this bus can be split up into three sections, each being supplied by one of the three 7000-kw. M-G sets, and the three buses operated at different voltages for special rolling schedules beyond the range of speed



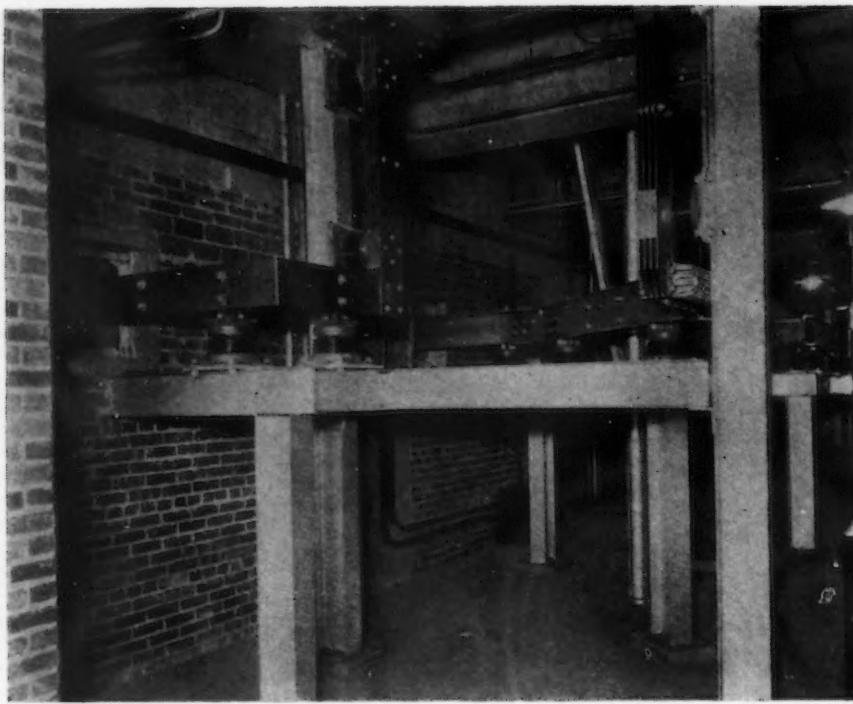


FIG. 2—The 600-volt bus connections under the finishing mill M-G sets.

control by motor field. Each 7000-kw. set is provided with a voltage regulator to accurately maintain the operating voltage selected by the operator. These regulators are automatically put in service in accordance with the selected bus arrangement.

Indicating instruments are provided on the mill floor in addition to those in the pulpits, so the head roller can check his mill set-up at a glance. Here also are provided recording instruments, so that an accurate record is maintained at all times of the mill performance, for the convenience of the mill superintendent.

Adequate protection of these enormous d.c. mill motors and generators is of utmost importance. When 21,000 kw. in d.c. generators and 27,000 hp. in d.c. motors are paralleled on one bus, short circuits may reach the tremendous value of 300,000 amp. A fast operating, high interrupting, capacity, silver-to-silver contact, magnetic blow-out, air circuit breaker, equipped with instantaneous overload is provided in each positive and negative side of each motor and generator for connecting these machines in parallel to a bus consisting of 10-in. heavy aluminum channel car sill. The positive and negative buses are spaced 11 ft. 7 in. apart, to reduce the stress between them on short circuit. Even at this spacing the stress between the positive and negative buses on a 300,000 amp. short is 630 lb. per ft. Although the insulators

are spaced every 4½ ft., this means a stress of 2835 lb. per insulator.

Since the motors are on one side and the generators are on the other, cross over buses are required to connect all the positive sides of the generators to the positive sides of the motors, and likewise for the negative sides. This presents a real problem in layout and design because of the proximity of buses and the attendant higher stresses on short circuit. Fig. 2 shows a view under the generators. Note how the positive and negative buses are separated as far as possible. The heavy steel and insulator support construction is apparent.

The main drive motors, gear units, M-G sets, switchgear, auxiliary M-G sets, air compressors, etc., are housed in a motor room 64 ft. 9 in. wide and 672 ft. long. Fig. 3 shows this room, viewed from the finishing end of the mill. To the right may be seen the seven finishing stand motors, 250-volt d.c. auxiliary power M-G sets and distribution board, the five roughing mill motors, and slab squeezer. To the left are the three 7000-kw. finishing mill M-G sets, exciter sets, duplex or master control board, metal-clad switchgear, and air compressors.

Much Heat Released

In this room is housed the equivalent of approximately 110,000 hp. in electric machines. The hourly electrical and gear losses release approxi-

mately 21,000,000 B.t.u. of heat, or that equivalent to burning 1500 lb. of good coal an hour. Ventilation therefore becomes a real problem. The system used is not one of taking all the air from outdoors, which carries a certain amount of dirt even through the best of filters, but of recirculating the air in the room through the machines down into the basement through coolers, and then as cool air back up into the motor room. A small amount—67,000 cu. ft. per min.—of make-up air is brought in through filters to insure a positive pressure in the motor room to prevent infiltration of dirt-laden air through leaks.

The foundations for the finishing



FIG. 3—General view of the motor room.

mill motors are so designed as to form a hot air tunnel under them. At each end of this tunnel are placed surface air coolers, through which, by means of 96,500 cu. ft. per min. fans at each end, the air is pulled down through the machines, cooled, and discharged back into the motor room. The same system is used under the three 7000-kw. M-G sets, requiring, however, two 112,500 cu. ft. per min. fans. Each of these four coolers for the finishing mill end is capable of cooling the air passing through it, to 95 deg. F. when using 85 deg. F. cooling water. This makes a total of 418,000 cu. ft. of air to be handled per min. for the finishing end alone.

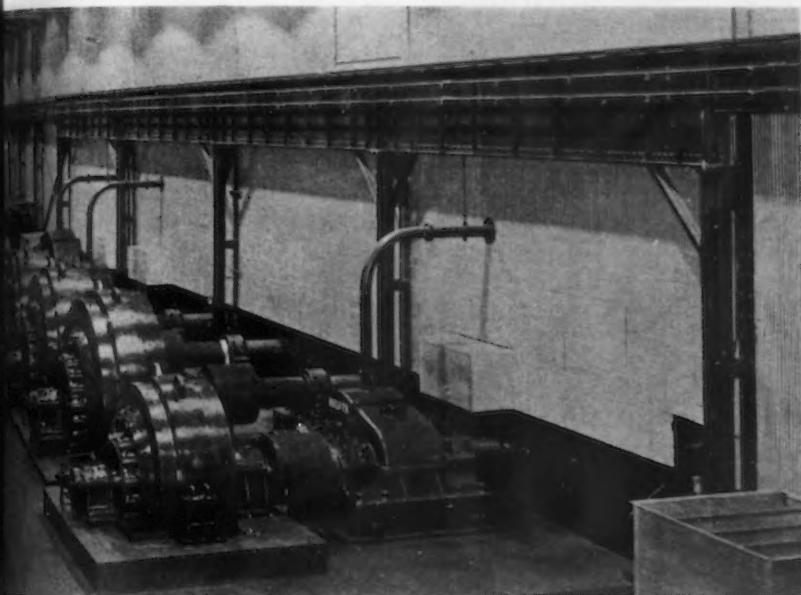
The roughing mill motors and auxiliary power M-G sets are ventilated down draft, the air cooled and discharged into the basement individually.

This air keeps the basement cool and finds its way back up into the motor room by means of a stairway at the roughing end, one at the duplex board, and through the runout table and flying shear M-G set foundations at the finishing end of the motor room. Thus, not only a cool motor room is obtained, but also a cool basement.

The installation is designed to cool a total of 536,000 cu. ft. per min. of air using 4100 gal. (of water per min.) at 85 deg. F., which is ample to handle any temperatures that may develop under maximum operating conditions and takes care of both electrical losses and those of the gear units. Of course, the temperature of the air delivered to

circuits from these are carried by metal inclosed buses (Fig. 4) through a tunnel passing under the slab storage building to the basement under the hot strip mill motor room. These six circuits go up through the floor to the incoming line 2000-amp. oil blast metal clad breakers, thence to the adjacent 1200-amp. oil blast metal clad feeder breakers.

All the metal inclosed bus, from transformers to oil circuit breakers, synchronizing bus structure, and metal clad gear, was completely assembled in the factory and shipped in sections suitable for handling. This in truth represents an achievement and a new step in construction.



View of the motor room from the finishing end.

the motor room decreases when water colder than 85 deg. F. is available in fall and winter. Motor room temperature, however, can be controlled by throttling the water. This cooling water is not wasted, but passes on into the mill for descaling, etc.

Beneath the clean and shining floor (Fig. 3) of the motor room lie some 30 miles of conduit and 135 miles of cable conductors connecting the various pieces of apparatus. All of that was detailed before any machinery was in place, or before any concrete was poured. None was missing when the concrete was poured.

Power for the entire plant is brought into an outdoor substation by two overhead lines at 69,000 volts and connected to three transformers. Each transformer is provided with two 12,500-kva. secondaries and the 6600-volt

To prevent excessive voltage swings on the 6600-volt system due to the intermittent swing from high leading reactive kva. to lagging kva. of the three 7000-kw. M-G sets corresponding to no-load and peak load respectively as slab enters the mill, a new type regulator was developed. This regulator holds an adjustable value of leading reactive kva. at all times.

Auxiliary d.c. power is supplied by two 1500-kw., 250-volt M-G sets and is distributed to the various load centers through automatic reclosing feeder air circuit breakers. All of the d.c. auxiliary drives, which are rheostatically controlled, are supplied with power from these sets. These drives for the hot strip mill proper include magazine pusher lifts, duplex furnace pushers, furnace charging tables, furnace delivery table side guard adjusting drives, slab return cooling bed pusher and main drive, screwdowns for scale breakers, edging roll drives, slab squeezer, approach tables at roughing stands, crop shears, flying shear pinch roll drive, pinch roll at piler, piler transfer, etc., etc.

The aforementioned rheostatic control panels are located in seven inclosed control houses along the mill walls at convenient locations, from a layout and operation standpoint. The panels are arranged in such an order that there is a minimum of conduit crossing, and also the cable and conduit runs are the shortest possible consistent with an economic layout of control houses. All panels were assembled on self-supporting frameworks, all resistors mounted and wired, all outgoing connections were carried

• • •
FIG. 4—General view of the 6600-volt metal inclosed bus under the pilasters through which the bus passes from the transformers down into the bus tunnel.

• • •





FIG. 5—Typical control station. This one controls the runout table and coilers. Note the master switches overhead which control infrequent adjustments.

to a uniform distance above the floor, and all interconnecting buses assembled in the factory. They were shipped in units averaging 10 to 15 ft. long, ready to set in place in the control houses. Such construction required a minimum amount of necessarily expensive construction work on the job.

Great care was used in this mill in locating the various master switches for controlling the auxiliary drives from the standpoint of convenience to the operator and his view. Note, for instance, the runout table and coiler control station shown in Fig. 5.

Auxiliary 440 volt, 60 cycle a.c. power is supplied from two 3000 kva., 6600 to 440-volt banks of transformers, one located just outside of the finishing end of the hot strip motor room, and the other outside the electric shop. The distribution board for 440-volt a.c. power and attendant bus structure was completely factory assembled. It is equipped with 2000-amp. air circuit breakers, each having an interrupting capacity of 60,000 amp.

This 440-volt power supplies all lightning transformers, ventilating fans, air compressors, exciter sets, looper M-G sets, scale sluicing pumps,

side guard adjusting drives, solenoids, thrusters, etc.

The five loopers between the finishing stands are equipped with adjustable voltage control, giving fast smooth operation and without high resistor losses when the motors are stalled. They are controlled from the finishing mill pulpit.

The most outstanding auxiliary drives, both from an engineering and an operating standpoint, are the flying shear and runout tables. These are of the adjustable voltage (or Ward Leonard) type of control; 200 7½-hp., 1750 r.p.m., 250-volt mill type d.c. motors drive the runout tables, which are divided into three groups between No. 10 stand and the coilers, and two groups between the coilers and the piler. Each motor drives two rolls. Adjustable voltage is supplied to each of the groups by a 300-kw., 250-volt generator. The control is so arranged that, when coiling, the two generators, which are normally used with the tables between the coiler and the piler, are transferred to, and used with, the coilers. This saves two generators. The outstanding performance of the d.c. runout table drive, from the standpoint of operation and power saving, has already been brought before the industry in several articles.

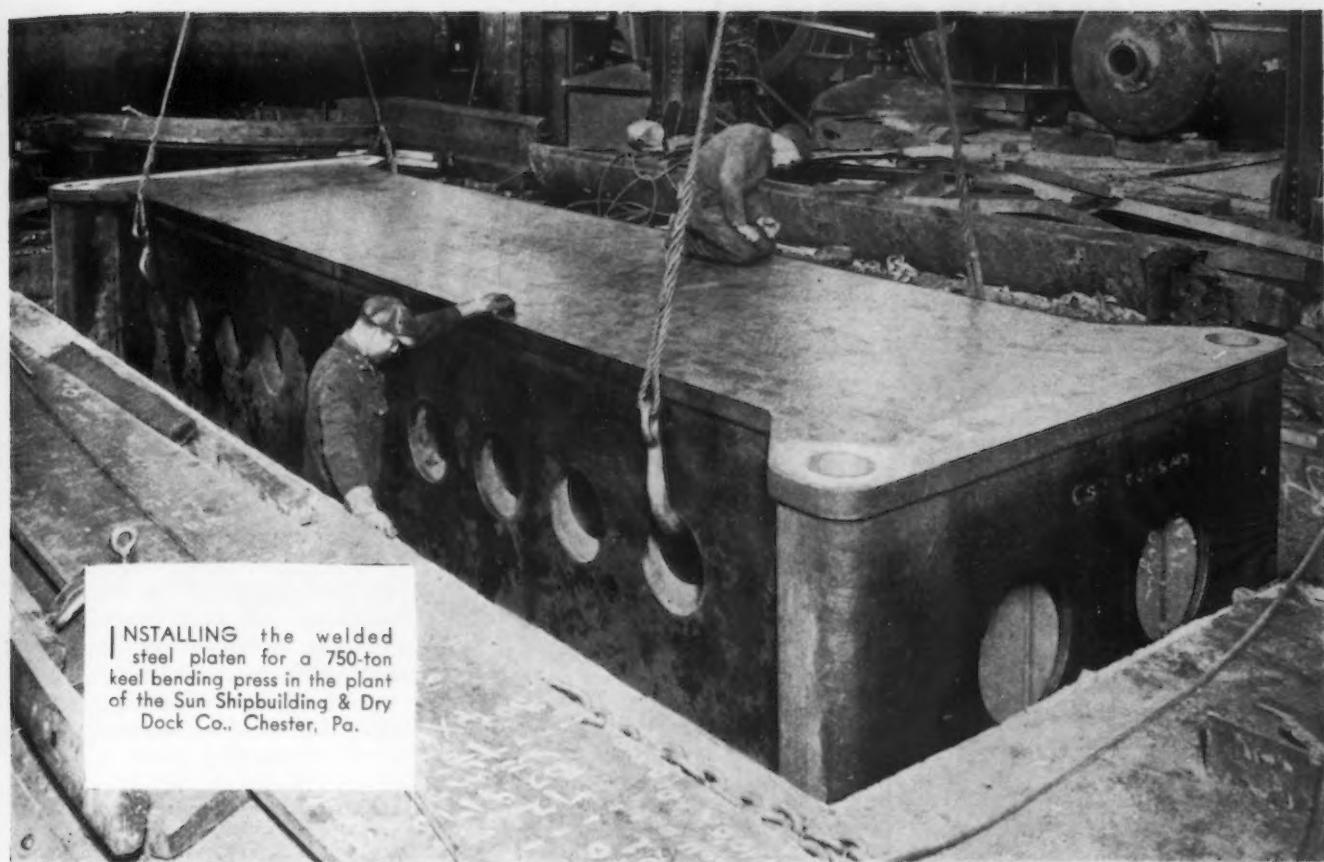
Power for the two 150-hp. flying shear motors is supplied from two 300-kw. generators, duplicates of those used for the tables. This makes it possible to use one 300-kw. generator as a spare for any of the five table motors, or the two flying shear generators. Switching is provided so that any one of these seven generators can be replaced with this spare in a few seconds.

The flying shear which is arranged for front-end cropping, tail-end cropping, or shearing to length, embodies an entirely new principle in the control which is simplified tremendously. This new type of equipment controls the excessively rapid acceleration and deceleration of the shear, speed matching, the amount the shear motors press against the Waterbury gear, and reversal and spotting of the shear, making complicated magnetic operation unnecessary for performing these functions.

Space does not permit a discussion of all phases, or even of all electric equipment used in connection with this hot strip mill. Only a brief discussion has been possible. Here, in truth, is a mill in the modern concept in which neither perfection of detail nor safety to operator and apparatus has been overlooked.

TABULATION OF MAIN DRIVE MOTORS, GEARING, ETC.

Stand No.	Motor HP.	R.P.M.	Gear Ratio	Roll Diameter	Roll R.P.M.	Flywheel HP.-Sec.
SB-1	1250	240	7.5	36	32.0	25,000
R-1	3500	150	7.845	38	19.1	45,000
R-2	3500	257	7.5	38	34.3	43,500
R-3	3500	400	7.5	34	53.3	70,000
R-4	3500	400	7.5	34	53.3	70,000
SB-2	500	150 to 600	9.3	25.5	16.1 to 64.5	
F-5	4500	125 to 250	4.238	27	29.5 to 59.0	
F-6	4500	125 to 250	2.571	27	48.7 to 97.3	
F-7	5000	80 to 160	1.0	27	80 to 160	
F-8	5000	100 to 200	1.0	27	100 to 200	
F-9	5000	125 to 245	1.0	27	125 to 245	
F-10	2500	175 to 350	1.232	27	142 to 284	



INSTALLING the welded steel platen for a 750-ton keel bending press in the plant of the Sun Shipbuilding & Dry Dock Co., Chester, Pa.

PLATEN FABRICATED IN 16 DAYS

AT five o'clock on a recent Friday afternoon, an official of Sun Shipbuilding & Dry Dock Co. at Chester, Pa., telephoned to the weldery of Lukeweld, Inc., Coatesville, Pa. At Sun Ship's plant, the bottom platen of a 750-ton keel bending press had broken. It was a gray iron casting, 27 ft. long, weighing 108,000 lb. The press was out of service—a vital missing link in one of the busiest shipyards in America. Production of the ship parts made on the keel bender was at a standstill.

Delivery within three weeks was imperative. That Friday night, Lukeweld engineers redesigned the keel bender platen for fabrication by welding. On the following days work progressed on three 8-hr. shifts daily. Six hundred man-hours of weld metal were poured into the welded platen. The second Monday—16 days after receipt of the order—the completed welded steel platen was on its way to the Sun yard at Chester, lopping five

days off the guarantee of three weeks.

The welded steel bed, 27 ft. long, 9 ft. wide and 4 ft. 7 in. deep, weighed 86,560 lb. The top of the platen was machined over its entire surface to a 3 ft. flange thickness from a rough plate gage of $3\frac{1}{2}$ in. The bottom flange is a steel plate 3 in. thick.

The web system is composed of three longitudinal webs, the outer two being steel plates $1\frac{1}{2}$ in. thick, the central one a 2-in. thick plate, with transverse vertical diaphragms 1 in. thick and spaced 24 in. apart, tying all three webs together. The 2-in. thick center web is solid, but circular holes were flame-cut in the transverse diaphragms and the two outside webs to provide accessibility for inside welding.

The top and bottom flange projections at the four corners, which provide connections for the tie rods, are separate plates of the same thickness as the main flange plates, and solidly welded to the main flange plates. If

plates of sufficient width had been immediately available, the top and bottom members would have been flame-cut to shape from a single plate as a matter of economy. The circular holes in the corners of the platen to receive the tie rods were flame-cut, allowing approximately $\frac{1}{2}$ in. of stock for boring to size after the bed was completed.

In the cast iron design, the bed had the conventional fish belly shape on the bottom side, giving the bed less depth at the ends. In the interest of economy and speedy completion of the welded platen, it was decided to use a straight lower flange. This change added to the overall rigidity of the structure. However, it required the removal of several cubic feet of concrete from the top of the press foundation where it sloped up to conform to the shape of the cast iron bed, and the provision of pockets to clear the bottom nuts of the tie rods. Existing foundation bolts were used.

THE decarburization figures obtained for regenerative batch furnaces are similar to those for the soaking pits (described in the first section), except that in this case the opportunity was available to compare the effects of different fuels as well as the effects resulting from furnace pressure on various steels. All results given in Table II and Table III are the average of many consistent tests. Table II shows the decarburization obtained in regenerative reversing batch type furnaces with natural draft and consequent necessity for a negative pressure at the hearth, while Table III is for the same purpose with forced draft and positive pressure in the furnaces.

One conclusion from a study of these tables is that the decarburization resulting from a furnace with positive pressure is considerably less than when the furnace is under negative pressure, all other things being identical. Also, for a furnace with negative pressure but fired with producer gas the decarburization is less than that resulting with either coke oven gas or natural gas, which is in agreement with the relative amounts of water vapor resulting from the complete combustion of these fuels, as shown in a preceding tabulation. Finally, natural gas shows relatively little advantage over coke oven gas under similar conditions, which again is in agreement with the fact that the water vapor resulting from combustion of these fuels is not much less for natural gas. Fig. 2 shows the results graphically for regenerative furnaces.

BURNER-FIRED BATCH FURNACES:

These furnaces are similar to the regenerative furnaces of the preceding paragraph in that they are of the box type with several doors along the front, and are used for the same purpose as those of the preceding group, but they are fired from the ends with burners using cold air for combustion. The use of burners provides a better mixing of the fuel and air than is possible in the reversing furnace where the air enters the furnace from the regenerator and mixes with the fuel in the furnace. Also, the temperature in the burner ports is higher than at any point in the furnace without burners, which affects dissociation of the gaseous products of combustion as already described. Table IV has been prepared to show comparative results from furnaces of this type

DECARBURIZATION

In this, the second section of a two-part story, the author presents specific data on decarburization in various types of steel heating furnaces. In the first section, all the factors determining decarburization of steel in open furnaces were described.

fired by several different fuels and heating a variety of steels.

The results are shown graphically in Fig. 3 and a comparison with Fig. 2 will show that the decarburization resulting in burner fired furnaces is somewhat lower than in the reversing furnaces where combustion is slower. This and other experiences point to the conclusion that minimum decarburization results when combustion of any fuel is as complete as possible before the products of combustion come in contact with the heating steel. Fig. 3 also indicates that the fuels highest in hydrogen cause the greatest amount of decarburization; in this case fuel oil, natural gas, and coke oven gas in the order named.

In the case of high-speed tool steels, the decarburization is difficult to measure by microscopic examination and can only be compared by analysis of turnings from a rolled bar. One method is to discard the outside 0.025 in. from the diameter of the bar and analyze the next 0.025 in. diameter for carbon to compare with the original analysis. The average of many tests by this method show that the drop in carbon after reheating 0.72 carbon

tool steel to about 2100 deg. F. in a coal fired furnace and rolling from a 2 in. square billet to a 1 in. diameter round is from 1 to 2 points. The same drop with natural gas and a reducing atmosphere is from 7 to 10 points, and with natural gas and an oxidizing atmosphere with positive furnace pressure is about 2 to 5 points.

CONTINUOUS BILLET FURNACES:

Continuous furnaces for heating billets to rolling temperatures have either end or side discharge, which has a considerable effect on the amount of decarburization obtained. With end discharge, the entrance of free air cannot be prevented and the decarburization is increased in comparison with a side discharge furnace where positive pressure can be maintained. Fig. 4 shows graphically the comparison between the results in an end discharge furnace fired with producer gas and heating SAE 9260 steel, and the side discharge furnace fired with natural gas with automatic furnace pressure control and heating SAE 1040 steel.

In spite of the fact that producer gas is the better fuel for decarburiza-

ON OF STEEL

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tion the end discharge furnace gives a greater amount of decarburization. Analysis of the atmosphere immediately surrounding the steel in this case showed 10 to 12 per cent oxygen as the result of the draft through the furnace. The values of Fig. 4 have been corrected to 300 per cent increase in area and can be compared directly with those of Fig. 2 and Fig. 3. In making such comparisons it should be remembered that in the continuous furnace the time in the furnace is spent in passing through a preheating portion of lower temperature before reaching the end of maximum temperature, while in a batch-type furnace the steel is charged directly into the hot furnace. The continuous furnace is for this reason inherently less decarburizing than the batch type furnace.

ANNEALING FURNACES:

In annealing furnaces the temperatures are lower than in the furnaces considered above, but there is frequently a cooling cycle during which decarburizing is likely to be at an increased rate due to air infiltration into the furnace. Also, there is frequently no subsequent reduction with corresponding increase in surface area to reduce the decarburization of the finished piece. An exception is the process annealing between cold drawing operations.

Two typical annealed results from similar car-type furnaces are shown in Table V. In each case, the car-type annealing furnace was equipped with automatic pressure control which maintained a constant positive pressure in the furnace during heating and holding, and reduced the infiltration of air to a minimum during the cooling cycle. In the one case, SAE 3140 was annealed with coke oven gas and in the other case SAE 52100 steel was annealed with natural gas.

CONCLUSIONS:

A summary of the conditions best suited for minimum decarburization in

open-fired furnaces is as follows:

- (1) A fuel low in hydrogen.
- (2) Positive pressure in the furnace.
- (3) Temperature as low as possible in most cases.
- (4) Combustion air slightly in excess of requirements for perfect combustion.
- (5) Burners with good fuel-air mixing characteristics.
- (6) Maximum reduction in section after heating.
- (7) Time at temperature as short as possible.

ATMOSPHERE FURNACES

The use of atmospheres for clean and bright heating commenced to be

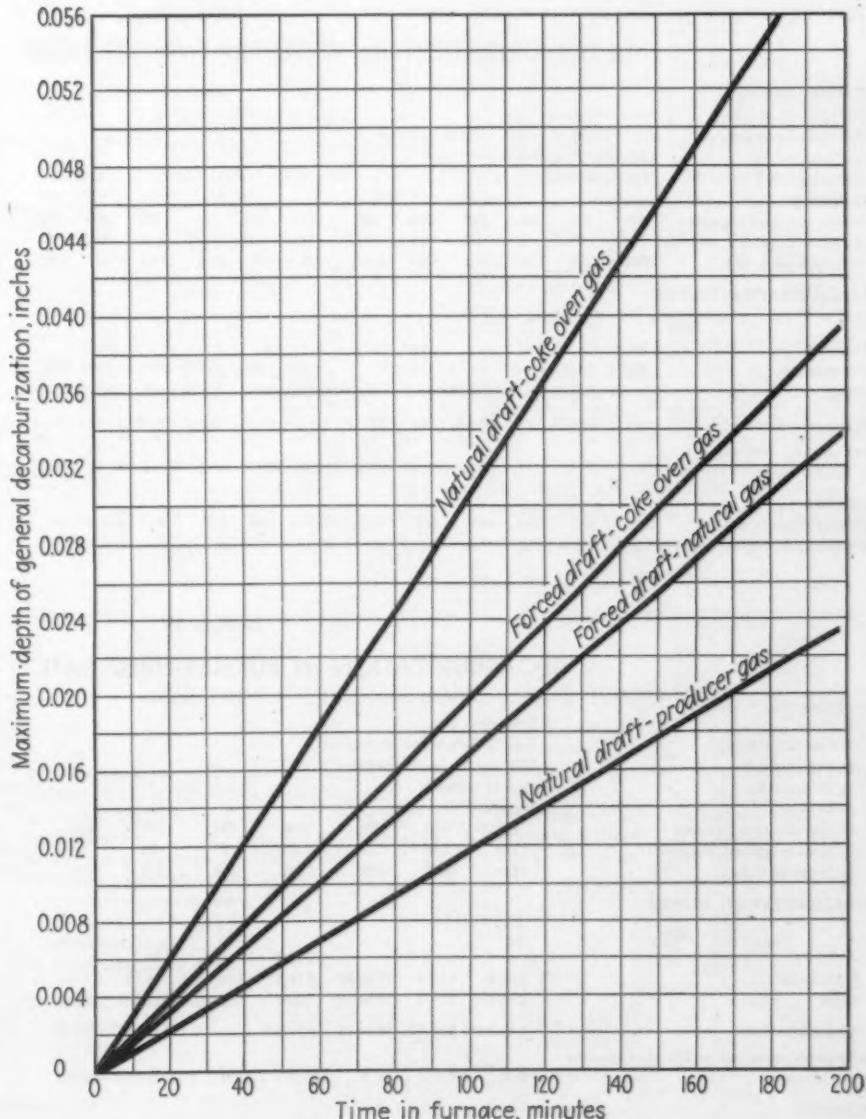


FIG. 2—Decarburization in regenerative furnaces. Decarburization is corrected to 300 per cent area increase.

TABLE II
DECARBURIZATION IN REGENERATIVE BATCH FURNACES, NATURAL DRAFT

FACTORS (See text, first section)		PRODUCTION											
(1) Fuel	producer gas	coke oven gas											
(2) Furnace pressure	-0.01	-0.01 in. water											
(3) Temperature, deg. F.	2300	2300, approximately											
(4) Air-gas ratio	oxidizing	oxidizing											
(5) Burners	none	none											
(6) Per cent area increase	235	286	400	246	246	246	305	267	267	267	400	400	400
(7) Time in furnace, minutes	235	105	120	95	103	64	90	94	64	68	135	120	162
(8) Grade steel, SAE	1020	1335	1340	1340	1340	1340	1340	1340	1340	1020	1020	1020	3140
DECARBURIZATION, INCHES		PRODUCTION											
		1000											
Complete		5 to 10		0 to 2		0 to 3		2 to 5		0 to 3	2 to 5	2 to 5	3 to 6
Pronounced		20 to 25		8 to 25	6 to 10	10 to 16	10 to 20	7 to 12	4 to 12	10 to 18	3 to 12	12 to 18	8 to 15
Slight				7 to 12	6 to 20	15 to 20	10 to 15	5 to 8	8 to 22	15 to 20	7 to 18	10 to 20	10 to 15
Actual total depth		25 to 35		15 to 37	12 to 30	25 to 35	20 to 35	15 to 20	12 to 34	25 to 35	10 to 30	20 to 35	25 to 40
Total depth, corrected to 300 per cent area increase		28	35	40	28.7	28.7	16.4	34.5	31.2	26.8	31.2	44.8	40
REMARKS		PRODUCTION											
Heated size, inches	8x7	5x5	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4	4x4
Finished size, inches diameter	3 $\frac{1}{2}$	1 $\frac{1}{4}$	1	1 $\frac{1}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1.87				

TABLE III
DECARBURIZATION IN REGENERATIVE FURNACES, FORCED DRAFT

TABLE IV
DECARBURIZATION IN BURNER-FIRED BATCH FURNACES

FACTORS (See Text)	Coke oven gas							fuel oil							natural gas	
(1) Fuel																
(2) Furnace pressure	0.02 to 0.05 in. water, positive							0.02 to 0.05 in. water, positive							0.02 to 0.05 in.	
(3) Temperature	2300 deg. F., approximately							2100 deg. F., approximately							2300 deg. F.	
(4) Air-gas ratio	slightly oxidizing							slightly oxidizing							slightly oxidizing	
(5) Burners	luminous flame type							low pressure oil burners							luminous	
(6) Per cent area increase	286	400	246	246	267	267	320	572	480	545	1700	545			267	
(7) Time in furnace, minutes	100	120	105	65	91	60	94	150	90	210	150	135			70	
(8) Grade steel SAE	1335	1340	1340	1340	1340	1340	1095	52100	52100	1085	1075	Nitrallyo			52100	
DECARBURIZATION, INCHES																
1000																
Complete					0 to 1			0 to 2							0 to 3	
Pronounced	2 to 5	1 to 4	10 to 20	5 to 8	1 to 5	7 to 12	3 to 6	0 to 2	2	6 to 10	3 to 5	2 to 10				
Slight	2 to 3	4 to 8	10 to 15	4 to 7	8 to 15	3 to 5	3 to 4								4 to 7	
Actual total depth	5 to 8	5 to 12	20 to 35	9 to 15	9 to 14	8 to 15	6 to 10	0 to 2	2	6 to 10	3 to 5	2 to 13			4 to 7	
Total depth, corrected to 300 per cent area increase	7.7	15.0	28.7	12.3	12.5	13.3	10.6	3.8	3.2	14.6	22.6	14.6			6.3	
REMARKS																
Heated size, inches	5x5	4x4	4x4	4x4	4x4	4x4	4x4	3 3/4 sq.	3 3/4	3 3/4	3 3/4	3 3/4			4x4	
Finished size, inches diameter	1 1/4	1	1 5/8	1 5/8	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2			1 1/2	

a factor in furnace design in about 1930 and has made rapid strides since that time. The first installations used hydrogen and hydrogen-nitrogen mixtures, which are still used for stainless and for some high carbon steel treatments. To reduce the cost of the protective gas, partial combustion of hydrocarbon gases was developed. With a 6:1 air-gas ratio and proper catalyst in a generator, the protective gas made from natural gas contains about 5 per cent CO_2 , 9 per cent CO, 1 per cent CH_4 , 11 per cent H_2 , no oxygen, and considerable water vapor. The water vapor can be reduced by refrigeration or driers to whatever degree is required. Such gas will protect the steel in most heating processes from oxidation to scale, but with this development the difficulties with decarburization increased. Adequate information is available on the many different types of generator equipment, and this phase of the question will not be considered in this article.

The fact that the purpose of these gases is to eliminate the oxidation of iron is the first cause of decarburization, because whatever removal of carbon occurs is not offset as it is in an open furnace by removal of decarburized surface through scaling. Therefore, in bright annealing it is necessary to establish conditions which are neutral to carbon, if decarburization is to be prevented.

The gases involved are the same as in the open furnace, and the causes of trouble are wet hydrogen, carbon dioxide, and oxygen. The first is affected by the dryness of the gas, the second by the air-gas ratio to the generator, and the third by the tightness of the container in which the protected steel is heated. Such is the condensed statement of the problem, but there are many ramifications to confuse the issue.

The difficulty from wet hydrogen comes from the fact that according to most authorities, the amount of water vapor needed to cause a decarburizing mixture is only 0.1 per cent. This means that rigid control of moisture is essential if reaction with steels containing more than 0.30 carbon is to be controlled. The first step is to dry the gas to a high degree of dryness as measured by the dewpoint temperature. The following tabulation shows the ratio $\frac{\text{H}_2\text{O}}{\text{H}_2}$ for different dewpoint tem-

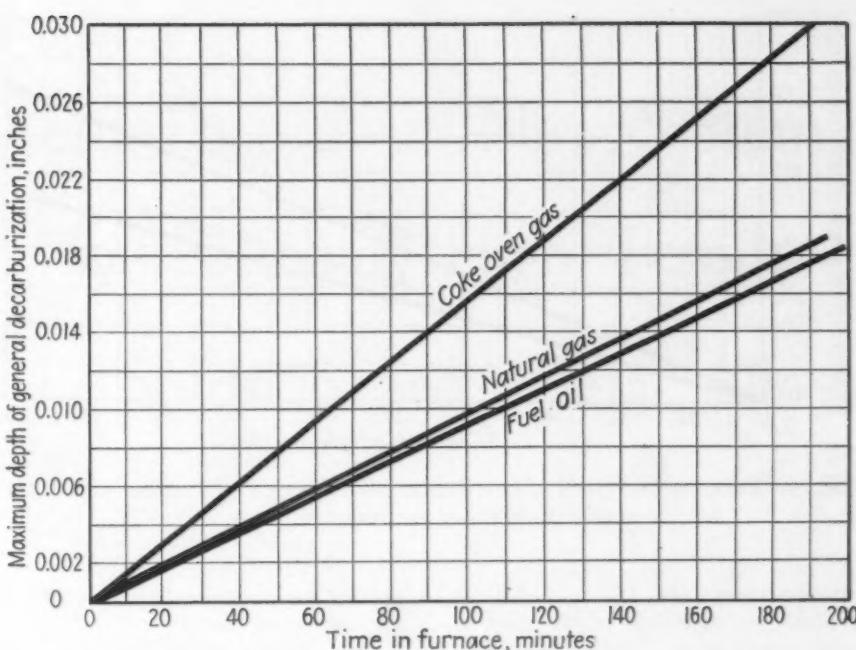


FIG. 3—Decarburization in burner fired furnaces. Decarburization corrected to 300 per cent area increase.

peratures with a generator gas containing 10 per cent hydrogen.

Dewpoint Temperature Deg. C. Deg. F.	Grains Water Per Cu. Ft. Gas	$\text{H}_2\text{O} \times 100$ per cent
+10 +50	4.80	14.3
0 +32	2.10	6.3
-10 +14	0.98	2.9
-20 +4	0.38	1.1
-30 -22	0.14	0.4
-40 -40	0.046	0.14
-50 -58	0.014	0.04
-60 -76	0.0036	0.01
-70 -92	0.0010	0.003

Most generators are designed to supply a gas at a dewpoint of minus 40 deg. C. and in some cases, notably the annealing of stainless steels, it has been found necessary to go as low as

minus 70 deg. C. Another method of controlling the ratio of H_2O to H_2 is the lean gas generator where almost theoretical combustion air is supplied to a water cooled generator to produce a gas high in CO_2 and with only about 2 per cent of combined H_2 and CO. The amount of moisture is greater and the capacity of the driers must be increased with this arrangement.

Having controlled the hydrogen and water vapor entering the furnace or retort, it remains to avoid all oxygen which will combine with the hydrogen to form more water vapor. This oxygen may be in scale on the steel, soaps,

TABLE V
DECARBURIZING IN ANNEALING FURNACES

FACTORS	Car Type Furnace	Car Type Furnace
(1) Fuel	coke oven gas	natural gas
(2) Furnace pressure	0.02 in. water, positive	0.03 in. water, positive
(3) Temperature	1600 deg. F.	1475 deg. F.
(4) Air-gas ratio	slight reducing	slight reducing
(5) Burners	Low press premix	high press injector
(6) Per cent area increase	none	none
(7) Time to temperature, hours	11	10
Time at temperature, hours	1	6
Time cooling to 900 deg. F.	22	29
Total time, hours	34	45
(8) Grade steel SAE	3140	52100
DECARBURIZATION, INCHES		
Complete	0.002 to 0.005	
Partial	0.020 to 0.028	0.015
Total depth	0.022 to 0.031	0.015
REMARKS		
Weight charged, pounds	21,000	15,000
Material	bars	tubing

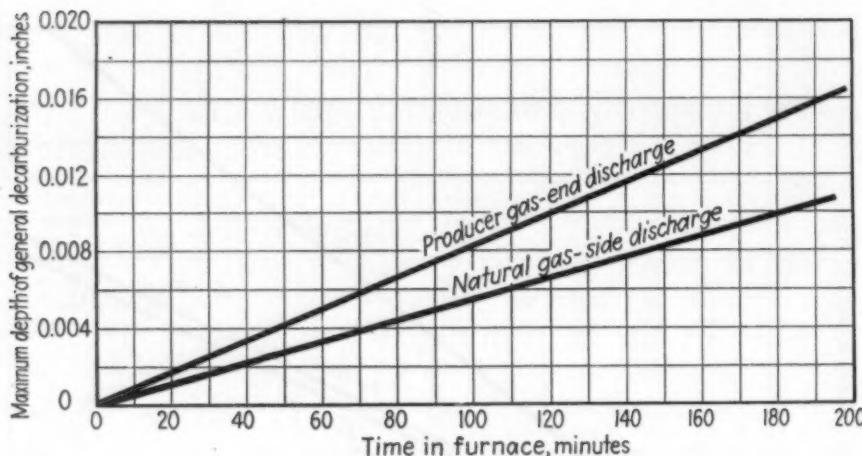


FIG. 4—Decarburization in a continuous billet furnace. Decarburization corrected to 300 per cent area increase.

lubricants, rust, etc., all of which must be watched carefully in the case of high carbon steels. Recent investigation has indicated the possibility of using CH_4 in small amounts to offset the effect of residual oxygen which cannot be avoided.

CO_2 is the next cause of decarburization to consider. With the usual 6:1 ratio gas this amounts to about 5 per cent of the gas by volume, and the present method is to remove it by means recently developed. This method utilizes a chemical which will mechanically absorb the gaseous CO_2 when cold and will give it up when boiled. By using this property in a circulating system comprising absorbing tower, boiler, and heat recovering units, it is possible to reduce the CO_2 content of the gas to less than 0.3 per cent at nominal cost.

Having reduced the CO_2 it is again necessary that oxygen be avoided, to

prevent the formation of more CO_2 in the furnace or retort.

The prevention of free oxygen in the furnace or retort is a mechanical problem of sealing, which is solved by properly designed sand seals, or by seals of oil or water outside the furnace.

Problems also arise in connection with the practical application of the gas. One is the obvious necessity for expelling all of the air from the furnace or retort before the steel reaches a temperature where decarburization may occur, which can best be accomplished by flushing with large volumes of gas at the beginning of the heat. Another is the necessity for drying all condensed moisture from the steel before charging.

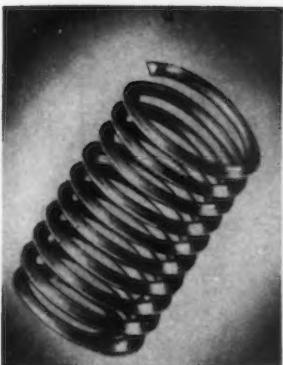
With this outline of the theory involved, it is now possible to examine the data in Table VI, which show the decarburization obtained with SAE

1035 steel and SAE 1060 steel under various atmosphere conditions. All of these results were obtained in an alloy retort with sand seals which was externally heated by gas burners. The purpose of the treatment was to normalize coiled rods, and after heating the rods were taken from the retort and cooled in air. Tests were made to show that this air cooling had little or no effect on the final decarburization, so that all of the decarburization occurred in the retort with the gases as indicated in the table. Where generator gas is specified it was made in all cases from natural gas with an air-gas ratio of 6:1 and supplied at a rate between 200 and 300 cu. ft. per hr. to an alloy retort of about 100 cu. ft. volume in which an average of 4500 lb. of steel was charged. The water vapor and CO_2 were removed to various degrees as shown by the analyses of the protective gas in the table.

This concludes this outline of the subject of decarburization, with the scattered data which were selected for illustration. It is hoped that around this outline further information may be built up, to the point where a better understanding of the phenomenon of decarburization may be developed. It constitutes a major problem in the steel industry, and is making slow progress because almost all available data are incomplete. From the outline presented here it is evident that many factors affect the reaction, and unless evidence pertaining to all of these factors is included in a report of decarburization the report can be only misleading and valueless. The purpose, then, of this article is to encourage more articles on the subject in which complete information is supplied.

TABLE VI
DECARBURIZATION IN RETORT WITH PROTECTIVE ATMOSPHERE

Grade steel SAE	1035 air only	1035 natural gas for 8 hr.	1035 natural gas for 5 hr.	1035 generator gas with 6:1 ratio	1035 generator gas 6:1 ratio, partly conditioned	1035 generator gas 6:1 ratio, partly conditioned	1035 generator gas 6:1 ratio, partly conditioned	1035 generator gas 6:1 completely conditioned	1035 generator gas plus natural gas	1060 generator gas condi- tioned	1060 generator gas condi- tioned, plus natural gas
Temperature, deg. F.	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Time in retort, hours	8	8	8	8	5	5	5	5	5	6	6
Protective gas analysis											
CO_2	.....	.....	5.0	2.0	0.0	0.3	0.4	.....	0.1	.....	.....
CO}	.....	.....	8.8	10.0	10.0	12.0	10.5	.....	13.2	.....	.....
O_2	21.0	.....	0.1	0.0	0.0	0.0	0.0	.....	0.5	.....	.....
H_2	.....	.....	12.1	11.6	10.8	13.0	11.9	.....	12.5	.....	.....
CH_4	85.0	85.0	1.1	1.3	0.0	1.5	0.8	.....	0.8	.....	.....
N_2	79.0	.....	71.9	75.1	79.2	73.2	75.4	.....	72.9	.....	.....
Dewpoint, deg. F.	.....	.....	plus 40	plus 25	plus 25	minus 22	minus 30	minus 40	minus 40	minus 40	minus 40
Rod surface	mill scale	mill scale	mill scale	mill scale	mill scale	mill scale	pickled	pickled	bright	bright	bright
DECARBURIZATION, INCHES											
Complete	.....	0.025	.....	0.020	0.010	0.010	0.005	.....	.....	.....	.....
Partial	0.020	Recarburized	0.010	0.030	0.016	0.015	0.010	0.015	0.010	0.012	0.005
Total depth	0.020	.....	0.010	0.050	0.026	0.025	0.015	0.015	0.010	0.012	0.005



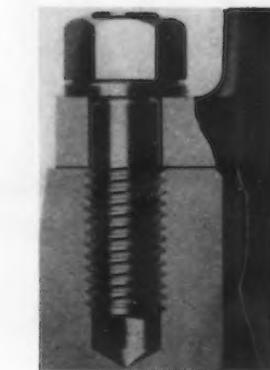
THE Aero-Thread insert is spirally wound from precision formed bronze spring wire in which hardness, strength, and surface smoothness are carefully controlled.

Aero-Thread—A New System for Fastening High Tensile Studs in Soft Metal Alloys

ERO-THREAD is a new screw thread system that was developed primarily for use in the aircraft industry, but which is receiving wide interest from other manufacturers. The first application has been in large aircraft engines where high stressed studs, such as cylinder hold-down studs fastening into aluminum or magnesium alloy crankcases, have presented many service problems. The system has universal application to all threaded parts, particularly where high strength and shock resistance are required or where fastenings are to be made in the light alloys or similar soft metals.

The outstanding feature of the Aero-Thread screw system is the use of a spirally wound insert or bushing of precision formed, high tensile, bronze spring wire. This insert fits into the tapped hole by screwing into the threads by means of a special inserting tool and a tang on the entering coil. Once the insert is installed it becomes a fixed part of the tapped hole. When the stud or cap screw is assembled, its bearing is against the spiral bronze insert, instead of the softer metal of the light alloy part.

The thread on the Aero-Thread studs and cap screws is of a shallow rounded form, fitting a corresponding form on the inner side of the insert. The complete elimination of all sharp corners in the thread on the stud or cap screw allows the use of studs and screws heat treated to high values of



tensile strength, and these screws have much greater shock resistance and fatigue capacity than is possible with screws having American standard or S.A.E. thread forms. In actual tests the Aero-Thread screws have shown two or three times the shock resistance and fatigue strength of screws with national form threads.

The inserts are formed from precision-shaped spring wire in which the hardness, tensile strength, ductility, surface smoothness and anti-frictional qualities are carefully controlled. The thread on the outside of the insert is similar to the American National screw thread. This results in a smooth, non-seizing engagement of the stud or cap screw, gives a non-wearing thread surface in the soft metal alloys and allows the tightness of the thread fit to be accurately controlled. This new system simplifies the servicing of studs and screws. It protects the threads in the female parts from

THE insert is screwed into the tapped hole and forms a hard seat for the cap screw. This system effectively protects the threads of soft alloys of aluminum, magnesium and zinc from wear and because of the rounded thread form on the stud results in greater dynamic strength and freedom from fatigue failure.

wear and damage and thereby eliminates the need for over-sized screws and studs, or for retapping the holes when replacements are necessary. If the insert should become damaged or worn, it can readily be replaced with a new insert and the threaded hole will be brought back to its original dimensions.

Aero-Thread alloy steel cap screws, heat treated to a minimum tensile strength of 150,000 lb. per sq. in., are offered in all standard diameters and lengths. Taps are provided to meet the exacting requirements of the aircraft industry and for all applications in light alloy parts where high precision is required. These Aero-Thread taps are available in all standard sizes from 3/16 to 3/4 in. inclusive. Taps, inserts, tools, studs and cap screws are available from Air Associates, Inc., Garden City, N. Y., or from their branches at Chicago, Glendale, Calif., and Dallas, Tex.

WHAT'S NEW IN PLANT

A NUMBER of new fan designs for industrial use have been placed on the market in recent months. Other items reviewed from selected announcements of the manufacturers include compressed air service apparatus, diesel engines and auxiliaries, pumps, filters, lubricators, equipment for maintenance work, sanitary facilities for the worker and safety devices.

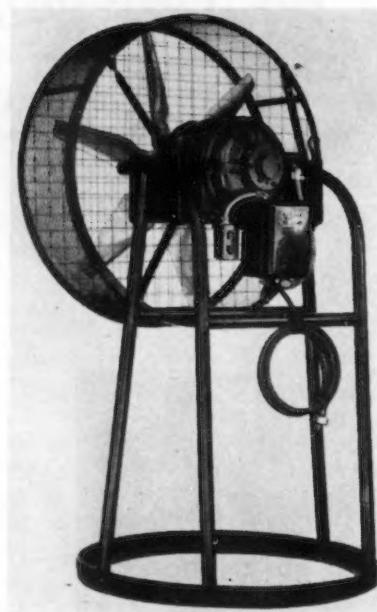
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PARTICULARLY adapted for man-cooling service in large plants such as steel mills and foundries is a new heavy duty Aero-spot fan, recently placed on the market by *South Bend Air Products, Inc.*, South Bend, Ind. The unit has a frame of heavy welded steel tubing and rolled angle ring base. Fan is driven by a fully inclosed ball bearing motor, equipped with magnetic starter and push button control. Fan itself is made up of three pairs of forged aluminum alloy blades, designed to give uniform air velocity across the entire blade area. The safety guard has $\frac{1}{2}$ -in. expanded metal on the periphery and 2-in. wire mesh at front and back.

FOR moving air at high temperatures or where the presence of acid vapors or other gases might damage the motor, the *Hartzell Propeller Fan Co.*, Piqua, Ohio, is offering a propeller type blower with the motor located on top of the blower housing. Power is transmitted to the fan by V-belt and the motor is mounted on a hinged platform. Belt is protected inside the blower by a steel guard. The patented Charavay tear drop propellers are incorporated, said to give high air deliveries against heavy back pressure. This type of fan is made in 12 standard sizes, with propellers from 18 to 48 in. in length.

Coated Fan Blades

WHERE extremely corrosive and highly concentrated acid fume or gas conditions prevail, the *Autovent Fan & Blower Co.*, Chicago, is offering fans with blades of heavy



BUILT to withstand the severest service, this heavy duty Aero-spot man-cooling fan is furnished in capacities from 3000 to 26,500 cu. ft. per min.

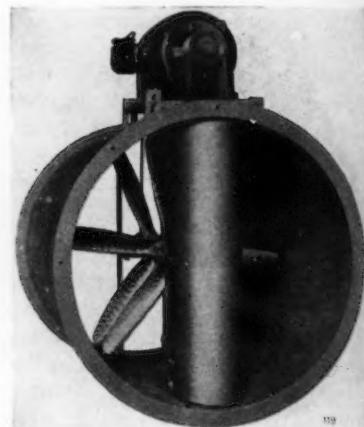
gage steel coated with a number of applications of Heresite finish baked at a temperature of 375 deg. F. This finish is applied by the maker, the *Heresite & Chemical Co.*, Manitowoc, Wis. For installations where acid and fume conditions are less severe, the fan wheels are treated with three coats of bakelite lacquer. Motors are fully inclosed.

The Autovent company is also supplying vapor explosion proof units with fan wheels of copper, brass or other non-ferrous metals and with motors bearing Underwriters' label Class 1, Group D. These blades can also be treated with Heresite where severe corrosive fumes are handled.

THE *Torrington Mfg. Co.*, Torrington, Conn., has announced a new design of pressure propeller fan blades for which it claims efficiency and quiet performance exceeding any design it has hitherto produced or tested. Designated as P-Aristocrat, the line includes standard sizes of 10, 12, 14 and 16 in., and can be supplied in any intermediate diameters. Eventually the line will be expanded up to a 30 in. size.

Portable Blowers

SEVERAL improvements have been made in the line of Tornado portable electric blowers made by the *Breuer Electric Mfg. Co.*, 5100 N. Ravenswood Avenue, Chicago. Waterlift on the 1-hp. model has been raised from $46\frac{1}{4}$ to 52 in., with proportionate increase on the three smaller sizes. New double grease seal ball bearings have also been adopted. When the units are used for vacuum cleaning, a Skraptrap has been developed that col-



MOTOR is located outside of the air-stream on this Hartzell-Charavay propeller type fan for handling air at high temperatures or carrying corrosive fumes injurious to the motor.

lects shall objects unavoidably drawn into the nozzle, thus preventing bolts, nuts, screws and nails from injuring the suction fan blades, yet readily bypassing dust, dirt and lint into the dust bag.

Condensate Air Trap

AN automatic snap-action mechanical trap for draining water from compressed air lines, tanks, separators and aftercoolers without any loss of air is a recent development of the *Armstrong Machine Works*, 869 Maple Street, Three Rivers, Mich. As shown in the cross-sectional view, the trap has a ball float which is connected to the short valve lever through a flat strip of stainless spring steel. With the valve in the closed position, this spring is bowed downward, but as water enters and the float rises the spring is bent until just past dead

SERVICE APPARATUS . . .

center, when its stored energy snaps the valve open. As the water level drops, the cycle is reversed and the valve snaps shut. This quick action is said to prevent dirt from lodging in the valve and causing leakage. Capacity is 1400 lb. of water per hr. at 125 lb. pressure.

Pump for Corrosive Liquids

A NEW stainless steel pump, the model 2K, is announced by the Duriron Co., Dayton, Ohio, for handling corrosive liquids. Several different types of material are used: Durimet, a nickel-chromium-molybdenum



AUTOVENT fans are now supplied with blades coated with baked on Heresite protective material for use where highly concentrated acid or gas fume conditions prevail.

low carbon alloy steel for handling weak sulphuric and other acids and caustics; Durco KA2S (18-8 chrome nickel) for nitric acid; Dureo KA2SMo (18-8 plus 3 per cent molybdenum) for pulp cooking liquors and phosphoric acid; and in other corrosion resisting ferrous and non-ferrous alloys of special analyses. Both suction and discharge are 6-in. integral flange openings. Closed impellers up to 13½ in. diameter and open impellers up to 14 in. are available. Capacities range up to 1700 gal. per min. for heads up to 140 ft. Pump is ball bearing equipped.

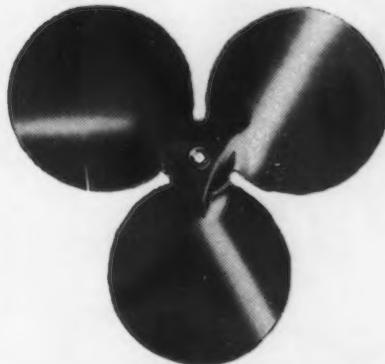
Priming System for Centrifugal Pumps

A SUBMERGED-SUCTION priming system that maintains a centrifugal pump full of water at all

By FRANK J. OLIVER
Associate Editor, The Iron Age

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times, whether running or standing, just as if the pump were located below the supply and that provides for continuously removing any reasonable amount of air inleakage is announced by the DeLaval Steam Turbine Co., Trenton, N. J. With this system, the water level in the suction space is raised above the center of the pump initially and is kept there during subsequent shut-downs by an air evacuating device, consisting ordinarily of a simple water, air or steam ejector discharging to waste at some convenient point. The starting and stopping of the ejector are controlled by a valve operated from a solenoid energized from an electrical device that responds



ONE-PIECE three-blade fans in 8 and 10 in. sizes and in either steel or aluminum have been added to the line of Aristocrat propeller fans made by the Torrington Mfg. Co. Similar one-piece fans with four blades in 10 and 12 in. sizes are also being offered. The steel hub is peened over the hole in the stamping.

to the water level within the priming chamber. After the initial evacuation of the suction line, the ejector does not have to operate unless the pump is shut down for a considerable period and then only for a few seconds at a time whenever inleaking air accumulates in the priming chamber. The

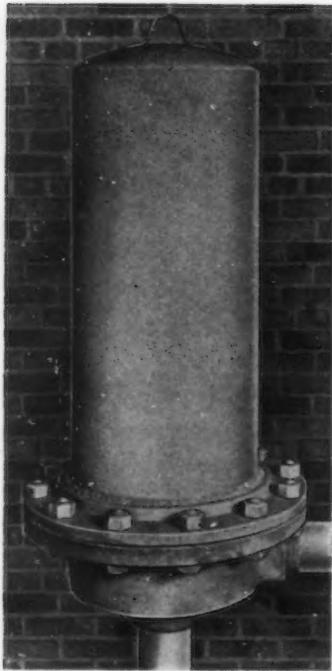
electrical control is such that the pump cannot be restarted until the impeller is submerged.

Self-Cleaning Filters

FOR handling lubricating oils, coolants and other industrial liquids, S. F. Bowser & Co., Inc., Fort Wayne, Ind., is offering two styles of automatic self-cleaning filters. In the same shell, two to six filter units can be mounted, giving a capacity range of 120 to 360 gal. per min. The filtering units are 6 in. in diameter and 26 in. long, made of special stainless steel or nickel and chromium medium of V-shaped wire, with ports ranging from 0.002 to 0.006 in., wound around a cast iron core. Removal of dirt at periodic intervals is effected by rotation of these cylindrical units against a stationary cleaning mechanism. Starting and stopping of the driving motor, connected through gearing, are effected through a differential pressure switch, set for a pre-determined drop in pressure between inlet and outlet sides of the filter. An exceptionally large sump is provided to per-



KRAPTRAP attachment for Bauer Torrando portable electric blower catches small metal objects that are unavoidably drawn into the nozzle when the machine is used as a vacuum cleaner. Injury to the fan blade is thus prevented and valuable waste material may be readily recovered.



ODORS of oil vapors and objectionable gases can be removed from compressed air lines with the Dorex pipe line adsorber, an auxiliary airstream filter of activated coconut shell carbon, which will absorb odors up to 15 to 20 per cent of its own weight. This unit is said to remove odors and vapors that cannot be stopped by the usual condensers, separators and aftercoolers. Size shown has a capacity of 175 cu. ft. of air per min. Made by W. B. Connor Engineering Corp., 114 East 32nd Street, New York.

mit long filtration cycles without the necessity of shut-down for cleaning. In model 822, the reduction gearing is within the shell; in model 823 it is located outside the shell so that it will not be damaged by metal chips and other solid particles.

2000-Lb. Lubricator

HILLS-McCANN CO., 2349 Nelson Street, Chicago, has announced a new force feed lubricator

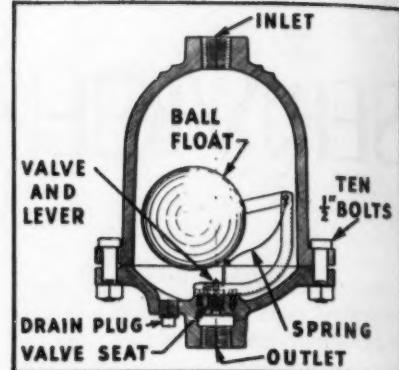


THIS ratchet drive Hills-McCanna lubricator is capable of delivering one to 10 drops of oil at pressures up to 2000 lb. per sq. in.

capable of delivering one to 10 drops of oil per stroke at pressures of 2000 lb. per sq. in. The drive consists of a positive ratchet, totally inclosed within the reservoir. It is available in single or multiple feed assemblies, each valve being independently adjusted. An outstanding feature is the built-in sight feed made of the unbreakable and transparent plastic, Lucite, replacing the familiar gooseneck spout. Special provision has been made to keep dirt or foreign matter from entering the feed lines by embodying fine mesh screens in the pump valve.

Floor Repair Material

FOR floor repairs or resurfacing where extra toughness and hardness are sought, Flexrock Co., 2300 Manning Street, Philadelphia, is offering Roxite, composed of diabase and black quartz. The material is quarried

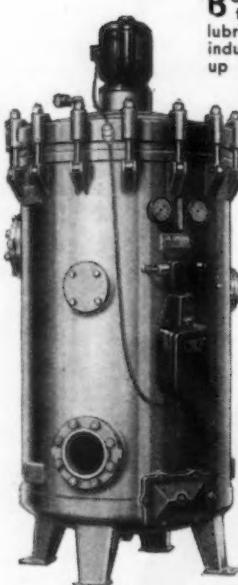


PRINCIPAL advantages claimed for the Armstrong automatic snap-action trap for draining water from compressed air units are immunity to ordinary dirt troubles, ability to discharge water without loss of air, positive opening and closing of the discharge valve and freedom from need for priming.

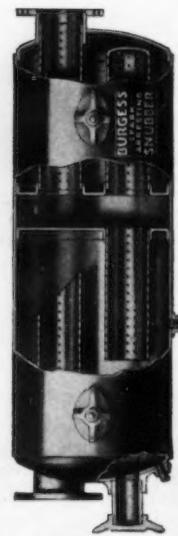
quartz. Roxite is recommended by Flexrock in place of sand and aggregate for use with any floor patching material, with high early strength cements, with portland cement and especially with any mastic patching material. With it the coverage of concrete repair materials is increased about 25 per cent, the company states.

Safety Apparatus

IPCO FOG-GLE cloth is intended to prevent the fogging of lenses in goggles, masks, shields and other



AT LEFT
BOWSER Fig. 822 automatic self-cleaning filter for lubricating oils and other industrial fluids. Building up of back pressure above a selected amount automatically starts the motor which rotates the cylindrical filter elements against fixed scraper blades.



AT RIGHT

SPARK arresting and sound absorbing snubber for diesel engine exhausts, made by the Burgess Battery Co., Acoustic Division, 500 W. Huron Street, Chicago. Because of the large cross-sectional path, the velocity of the gases is low and the larger particles tend to separate out by gravity. Finer carbon particles are thrown out by centrifugal action due to changes in direction and velocity of the gas stream. This SDHS snubber can be installed anywhere in the exhaust system, but must be mounted vertically.



ABOVE

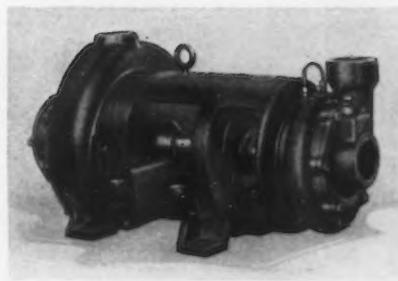
HUMPHREY flow indicator for installation in circulating oil lines. It operates in connection with a needle valve installed in each branch line to a single bearing. Should the oil line plug up between pump and bearing, the indicating hand moves to danger zone marked on the dial. Application can be made to lines carrying pressure to 150 lb. per sq. in. Marketed by the Industrial Instrument Co., 96 E. Miller Avenue, Akron, Ohio.

in Pennsylvania and after crushing is washed free of silt and other foreign matter, then graded and dried. The material is said to be hard enough to cut glass and tough enough to withstand impact that will crush ordinary

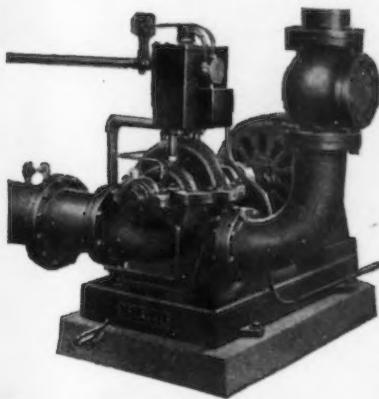
safety equipment where glass is used. This is accomplished by a non-toxic wetting out agent in the cloth that reduces the surface tension of the glass. In use, both sides of the glass are simply wiped with the cloth, which comes packed in a transparent envelope. Fog-gle cloth is supplied by *Industrial Products Co.*, 755 W. Somerset Street, Philadelphia.

Respirators

WILLSON PRODUCTS, INC., 264 Thorn Street, Reading, Pa., has recently received Bureau of Mines approval on two new types of respirators. Respirator No. 752L is a low resistance twin filter respirator for protection against both type A and lead dusts. It employs a small rubber, form fitting face piece so designed as



LATEST addition to the line of Worthington Monobloc centrifugal pumps is this compact turbine driven type, applicable where only steam power is available or where explosive atmospheres exist. Capacities range from 10 to 400 gal. per min. at 10 to 240 ft. dynamic head, with steam pressures ranging up to 300 lb. per sq. in. maximum. Pump fittings may be had in bronze, iron or special materials.



An automatically controlled ejector keeps air from accumulating in the pump casing and hence keeps this DeLaval centrifugal pump continuously primed, just as if the pump were located below the supply.

VISIBLE automatic, constant level oilers, with practically unbreakable plastic reservoirs and an adjustable oil level, have been put on the market by the Trico Fuse Co., Milwaukee. They are made in 1, 2, 4 and 8-oz. capacities, with oil bottles interchangeable, and in two styles for standard surge and high surge levels, having side outlets only and also side and bottom outlets for bottom connection. The reservoir is attached to the lower casting by the threaded spout.

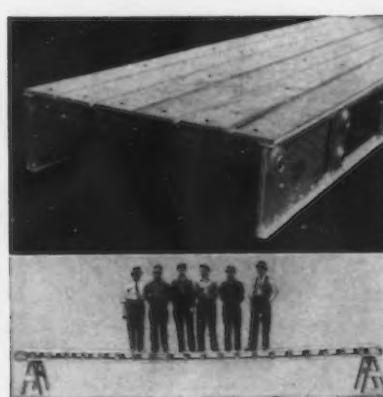


to permit wearing of goggles or spectacles. The Rotiform filters have 30 sq. in. each of filtering surface.

Respirator No. 770, illustrated, has been approved for protection against fumes of metals such as lead, mercury (except mercury vapor), manganese, magnesium, aluminum, antimony, arsenic, copper, chromium, iron, cad-

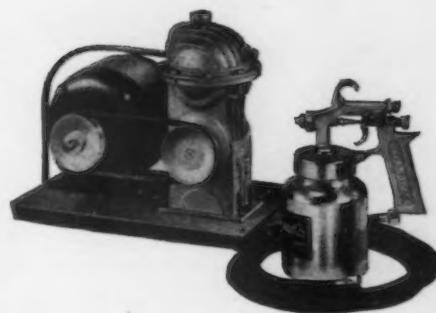


TYPE CC totally enclosed, direct injection diesel engine, made by Worthington Pump & Machinery Co., Harrison, N. J., is adaptable to pumps, compressors and other power drives. Of the four-cycle, trunk piston type, the engine has cone type cylinder heads, said to eliminate possibility of head breakage due to load and temperature stresses. All moving parts are wholly enclosed and are pressure lubricated. Positive sight feed lubrication of the cylinder walls is also provided. Liberal oil storage is built into a deep sump in the base.



FOR use in maintenance work in factories, **Aluminum Ladder Co.**, 130 Adams Street, Tarentum, Pa., is offering an aluminum stage, made in lengths from 8 to 25 ft. and from 12 to 24 in. in width. The 25 x 2-ft. stage shown weighs only 118 lb. and is carrying a load of 1055 lb. without noticeable deflection. All parts of the stage are bolted or riveted together, including the wood covering. Guard rail can be supplied on one or both sides.

mium and zinc resulting from sublimation or the condensation of their vapor or from chemical reactions between their vapors and gases. The rubber face mask of the device fits snugly under the chin and an air tight contact is obtained with but slight tension on the adjustable elastic headband. Exhalation of used air through the exhaust valve is aided by



FOR general maintenance painting, the Electric Sprayit Co., 220 N. Broadway, Milwaukee, has developed its series 200 portable paint spraying unit. The compressor, which is driven by V-belt from a 1/4-hp. motor, is of the diaphragm type, a design that prevents contamination of the air by crankcase oil. Diaphragm is of neoprene, backed by fabric. Spray gun is of the pressure feed, internal break-up type. It and the 1-qt. container are made of aluminum. Gun will deliver a spray up to 8 in. wide.

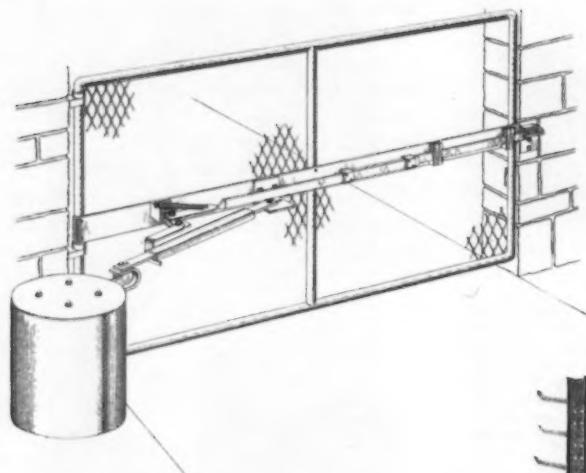


Of interest to the maintenance department are the sets of carbide tipped masonry drills, offered by the Super Tool Co., 21650 Hoover Road, Detroit. These sets are supplied in three ranges of drill sizes: from 3/16 to 1/4 in., 3/16 to 1 in., and from 3/16 to 1 1/2 in. They are packed in neat and substantial wood boxes.

twin inhalation valves in the mask interior.

Cellulose Sweat Pad

DRYBROW is a new form of sweatpad designed to be worn over the forehead so as to prevent perspiration from trickling into the eyes of workers in hot locations. The device consists of a flat piece of *du Pont's* fine pore cellulose sponge



ABOVE

TYPICAL installation of a model Q electric operator for single-leaf swinging gates, made by the Barber-Colman Co., Rockford, Ill. It is suitable for standard wire mesh gates up to 14 ft. in width and 7 ft. in height. Under the cover at the left is the driving motor, with speed reducer and adjustable friction clutch at its upper end. The crank rotates with the cover. The locking mechanism is actuated by the driving crank at the beginning of the opening stroke and at the end of the closing stroke. About 12 sec. is required to unlatch and open the gate when the control switch is closed. In the model QR, a relay is incorporated so that only momentary contact is required for operation.

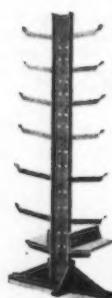
bound at the ends with tape and equipped with a one-piece latex rubber headband. The pad is said to absorb 20 times its weight in moisture, and it resists chemical action of perspiration. When dipped in cold water and gently squeezed before wearing, the pad provides a cool application for the head. This device is a product of the American Allsafe Co., Buffalo.

Salt Tablet Dispenser

A NEW type of dispenser for supplying workers exposed to high temperatures with salt tablets to prevent heat sickness resulting from loss of body salt through excessive perspi-



WILLSON respirator No. 770 is a Bureau of Mines approved type B mechanical respirator for protection against fumes of metals, particularly lead.

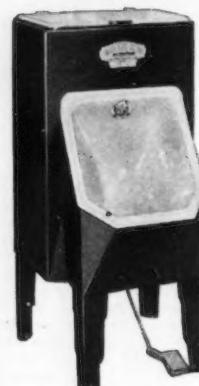


AT LEFT

BAR stock racks made by Pollard Brothers Mfg. Co., 5500 Northwest Highway, Chicago, have been redesigned so that the seven bars supplied with each can be placed in any arrangement on 3-in. centers, instead of on seven fixed centers. They are made in both single and double arm types, the former for placing against a wall. Base is a heavy casting to which an upright channel is bolted. Channel is 65 in. high.

AT RIGHT

HAND washing in a Showerway is accomplished under a gravity flow of warm water and liquid soap when the treadle is pressed. Water is heated electrically in a 6-gal. stainless steel tank, and the temperature is controlled thermostatically. Filling can be done by bucket or automatically from the city main. There is also a kerosene heated model. Because of the gravity flow, 6 to 8 oz. of water is said to be sufficient for a thorough hand washing. This unit is a product of Lyon Metal Products, Inc., Aurora, Ill.



WALTER KIDDE & CO., 140 Cedar Street, New York, announce their new Kidde-LUX portable carbon dioxide 2-lb. fire extinguisher. This unit features a pistol-grip handle with trigger-control valve and self-locking horn. Efficient discharge of carbon dioxide, without waste, directly on a fire is provided by finger-tip control and balanced one-hand operation.

ration is announced by the Davis Emergency Equipment Co., 55 Van Dam Street, New York. This dispenser is made of black plastic, which is chemically inert to sodium chloride. When a knob at the bottom is turned in either direction, a single salt tablet is dropped into the hand for taking with drinking water. Two sizes are made, one holding 1000 tablets, the other 500.



In these group showers, made by the Bradley Washfountain Co., Milwaukee, water is turned on automatically when users stand upon the treadle platform. Pretempered water is used, assuring safety and reducing water consumption. Made in both circular and semi-circular forms, five and three-person accommodation, with or without partitions.



FOR protection from hot sparks, dust and flying particles, this improved eyeshield is being offered by the Jackson Electrode Holder Co., Detroit, Mich. Visor can be had in clear, smoked, amber, light green or dark green material, non-inflammable, and has a metal binder for stiffness. A spark deflector guards the space between visor and forehead, and a fireproof duck skull cap extends half way back over the head. Visor is well ventilated.

Foundation Being Laid for Broad Economic Upturn, Says Alfred P. Sloan, Jr., of General Motors

CITING the hundreds of new products and new processes recently developed or now in process of development, Alfred P. Sloan, Jr., chairman of General Motors, declared Tuesday, in a statement prepared for the forthcoming quarterly report to stockholders, that there exist today the fundamental elements essential to a broad and sound upturn in economic activity, with an accompanying promotion of new job opportunities.

"With only casual public notice," Mr. Sloan asserted, "there has been emerging from industrial laboratories and scientific work-shops everywhere, during the depression years, a flow of new products and new concepts which bid fair to create for us, in reality, a new world of tomorrow."

Mr. Sloan gave emphasis to the results of his recent survey among more than 100 industrial organizations, large and small, made in connection with the General Motors exhibit at the New York World's Fair, which he said reveals an amazing number and variety of new things—some already being produced on a commercial basis, others so well advanced in the laboratory as to indicate the probability of their practical application in a short time.

"We have had forced on our attention too much the descending spiral of events that led to depression lows," Mr. Sloan declared. "It seems advisable to recall here that there are equally effective and powerful forces which, once set in motion and given freedom to act, will build an ascending spiral leading to new levels of prosperity and progress."

Mr. Sloan, pondering the often-raised question — What motivating forces are in the offing to act, as did the great industrial developments of past decades, as new accelerating agents for the general economy?—offered in reply the statement that "one emphatic answer lies in the laboratories of industry, in the constant striving for more and better products at lower cost. No substitute has yet been found for continuous and laborious industrial research as an instrumentality for the production of better values for customers and the promotion of new job opportunities."

"The horizons of enterprise were

never broader than they are today. New knowledge and new skills have opened up fields of possibilities little dreamed of even a decade ago. There exist the elements that will importantly contribute to the restoration of our national economy, the renewal of the upward trend in our standards of living and that security which only opportunity can supply. These social and economic goals lie well within our reach."

As proof of his assertions, the General Motors Chairman cited numerous examples from a long list of recent industrial developments as indicative of the means by which we may overcome our accumulated deficiency of goods and move again toward a resumption of the upward trend. He explained that as new products are created and new methods discovered to bring new and old products within the reach of more people, job opportunities are created and better standards of living prevail.

"Practically every field of endeavor supplies news of new activities, new possibilities," Mr. Sloan stated. "In air transport, for instance, it is apparent that we are just now entering upon an era of vast opportunity and growth. Transoceanic mail and passenger flying has already achieved the status of routine schedules, carrying new social and commercial benefits to peoples everywhere."

"Railroad transportation, too, is moving rapidly into new ground. From research have come new diesel-powered locomotives to speed up service and reduce costs. Improved types of roadbed, the increased use of air-conditioning in passenger trains, high-speed, light-weight equipment, traffic control systems permitting faster freight schedules, studies in fuel economy, and many other developments, indicate a bright future for the railroad—the backbone of our transportation system."

Chemistry Opens New Fields

"In no field of industrial research has greater progress been made during the depression years than in that of chemistry. The science of synthetics, through which new substances are brought into being from coal, milk, cotton, wood, from water and the ele-

ments of the air, seems to broaden with each forward step. Plastics, a growing family of chemically-created materials, are finding hundreds of new uses in industry and the home.

"Similar industrial developments are taking place in communication, just now pioneering in television and facsimile reproduction by radio; in metallurgy in the production of new alloys; in the field of health with preventive medicine and food preservation; in the production of new types of power and light; in farming, through studies in plant culture and experiments with low-cost implements.

Progress in Machine Tools

"Moving side by side with the development of new products is the steady progress being made in the perfection of machines and tools for performing industrial work. New products frequently call for entirely new techniques and new types of machines. In addition there is the constant demand for improved tools and equipment to produce present things more efficiently and, through better quality and lower prices, promote their wider use. Through the introduction of new mills and presses, lathes, hoists and forges, new abrasive tools for sharpening and grinding, tools for tasks too heavy for muscles or too delicate for the human touch—through persistent research in methods and processes, the machine tool industry is paving the way toward better technology."

Only Confidence Is Needed

"Seldom in so short a period of time have so many possibilities appeared upon the industrial horizon. Combined, they constitute a most significant contribution of industry to economic and social progress. It may be said, therefore, that there exist today the fundamental elements essential to a broad and sound upturn in economic activity. There is awaited only the conviction in the minds of people everywhere that our national economic policies will be revised so as to warrant the taking of the essential risks on the part of investors and the spending of money for durable goods to capitalize the manifest opportunities. But there is needed also the assurance that new enterprise to manufacture and market these new products will be freed from restrictions which now largely nullify all probable gains. In particular, those developments that make for improved quality and lowered prices of goods and services must be allowed and encouraged to exert their full force, to the end that more and more people may be able to buy."

THIS WEEK

ON THE

ASSEMBLY LINE

By W. F. SHERMAN
Detroit Editor

... Strike threat to production softens tone for steel in Detroit . . . Model changeovers cut production to 47,420; low point about a week away . . . Engine testing time cut to minimum by surface finish improvements . . . Studebaker to reveal new models to press on Aug. 15 at South Bend.

DETROIT—Each passing day the UAW's unprecedented strike against General Motors becomes a more serious matter. Already it has affected production of parts and sub-assemblies and it has so seriously affected deliveries of materials such as steel that the outlook for final July tonnage totals is rather bleak. Not only General Motors Corp., but a large group of manufacturing plants which supply parts and virtually all of the steel companies supplying GM, have felt the delay.

Although it is believed that 1940 production for the corporation as a whole would get under way with no serious field shortages evident if the strike could be settled in the next week, the tie-up already is responsible for an important delay at Buick (which should have been building 1940 cars by now) and also at Oldsmobile and Pontiac. Corporation officials conceded more than a week ago that every day of striking on the part of the skilled workers meant one day's hold-up in

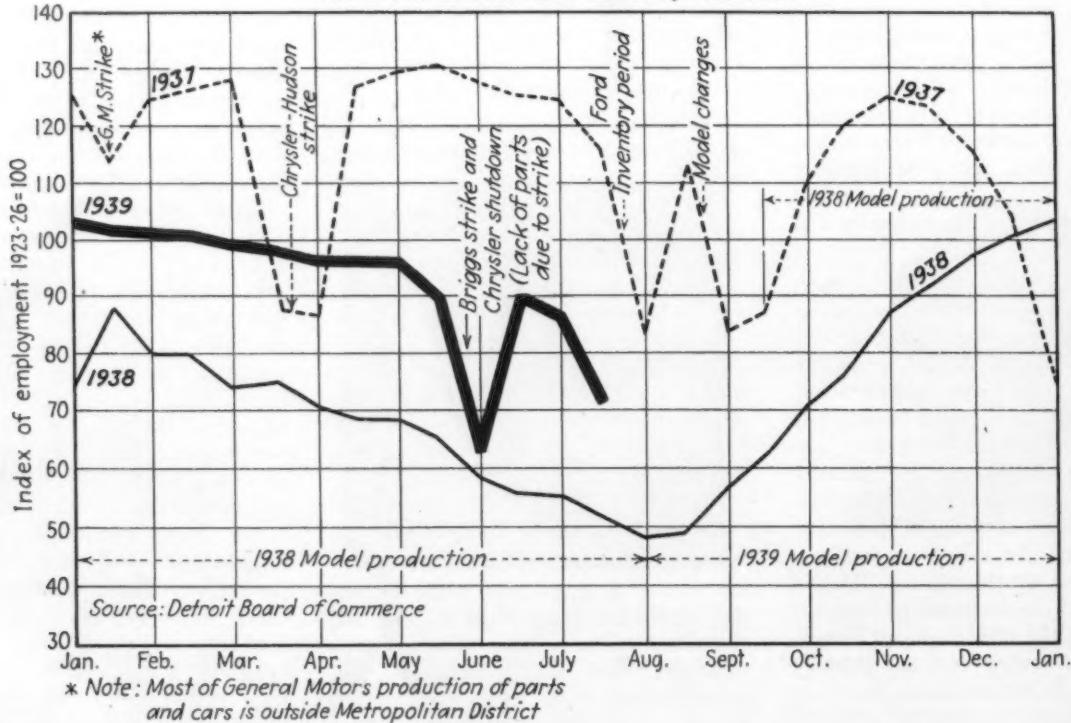
production and loss of work for the rank and file.

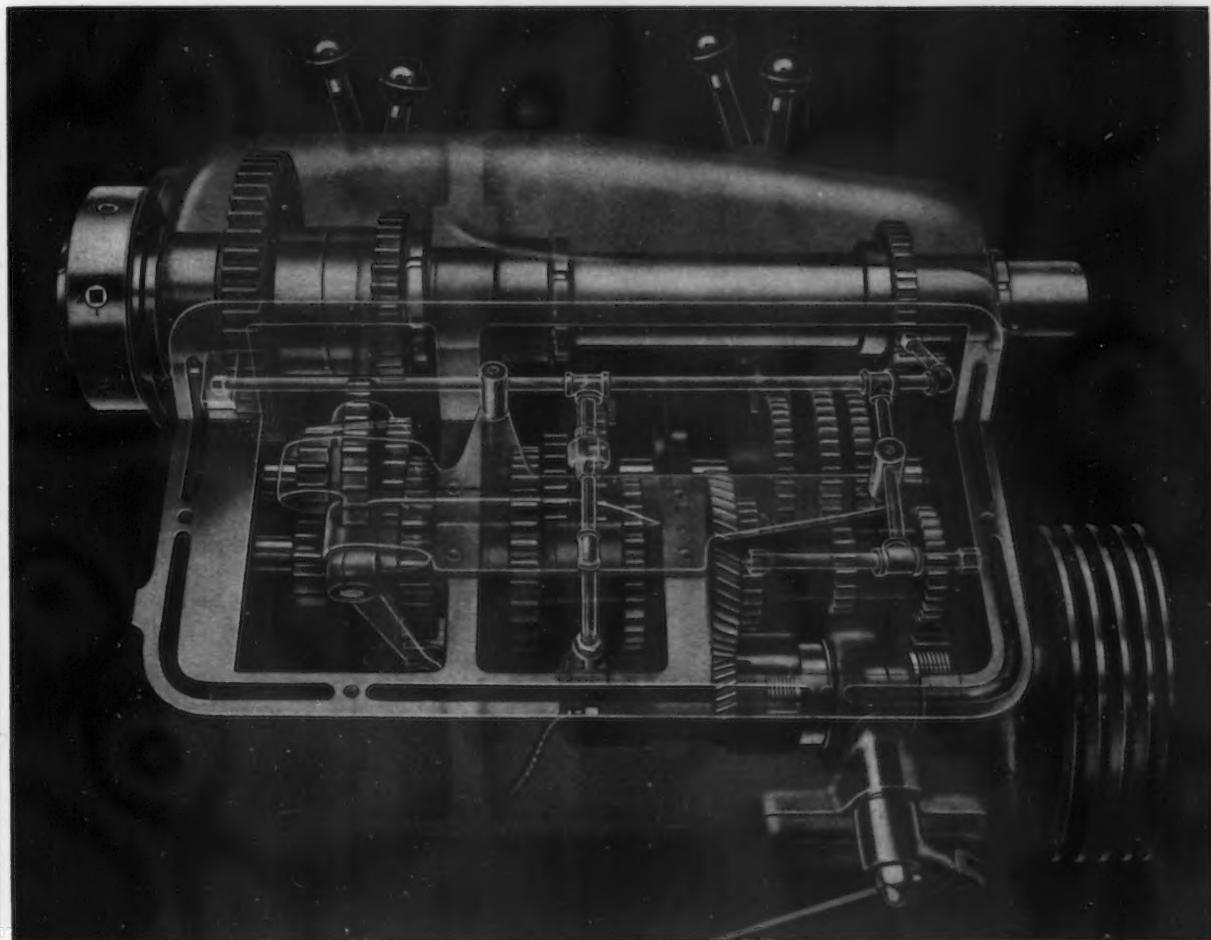
Production delays and failure of manufacturers to get new models in the hands of dealers and customers in the psychologically correct time can be very costly indeed. One of the outstanding incidents illustrating this point occurred only a few years ago when Chevrolet was thrown off stride and lost first position in sales because its cars were announced late.

It is generally agreed that this is the only explanation that could be offered for Chevrolet's drop to second position in 1935. Chevrolet men have this year's experience (1935) well fixed in their minds to help them speed preparations for each succeeding year's new models.

Even though automobile company officials know certainly that delays in bringing out new models reduce sales and ultimately decrease production,

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union officials consistently ignore the facts and are today preaching to the UAW strikers the strange gospel that "there are just so many cars to be made, and you men will make them. The only difference is they will be made later." In view of the facts of the case, there may be some disappointment when the score is chalked up for 1940 sales.

On the other hand, the situation is that approximately 100,000 production workers will stand by, jobless, in support of the few thousand tool and die workers who are striking, while other automobile plants roll merrily along on 1940 models. Probably in anticipation of some attempts to continue production, union officials have called meetings for all GM power plant workers, indicating that the union may be forced to resort to a power plant strike to keep its walk-out effective.

Strike's Effect Diminished

The over-all effectiveness of the tool and die strike is being diminished as some of the skilled workers each day drift back to work. Instance is

one of the Fisher plants, not in Detroit, where the first day of the strike found only 30 workers on the job. Count one day last week showed 177 reporting in the morning.

The industry has almost given up the vigil which some had maintained after General Motors petitioned the NLRB for certification of the legal bargaining agent to settle the dispute about whether the CIO or AFL faction of the UAW was entitled to claim possession of the contract with General Motors. As far as can be learned no action of any sort has been taken by the board to be of assistance in the current dispute.

Since the union has dropped its initial demand for a supplementary agreement covering tool and die workers, arguments have centered on three main issues: An increase of 10c. per hr. for skilled workers and minimum rates; the demand that the union label be placed on all tools and dies; double time for Sundays and holidays and time and a half for Saturdays, regardless of hours worked during the week. All of these demands have been re-

jected by General Motors. The corporation insists that wage questions must be settled locally in each plant as provided in the contract. It has offered certain adjustments in its overtime policy, but the union has refused to compromise. The demand for union label on tools and dies has been flatly rejected by the corporation as impractical.

Steel activity hesitates seriously in the Detroit area, as a result of the GM strike. Deliveries to General Motors plants and parts manufacturers have been halted or greatly reduced in most cases. It is estimated that July shipments will fall far below expectations, although this month had been slated as a period when tonnage shipments would build up rapidly. Chrysler plants and suppliers are active, as expected, and this is one of the bright spots.

Despite the revelation that Ford would seek 75,000 tons of steel in the last week, most local steel offices have very little information about the requirements.

No serious threat to prices is seen, although the naturally cautious are watching the situation with the price question frankly on their tongues. The reported requirement of 75,000 tons is a large one, even for Ford, because the steel mill at the Rouge has been operating steadily, though at a reduced rate, right along.

Production to Decline Further

Production totals of 1939 models went into the expected slide last week and dropped to 47,420 passenger cars and trucks, which compared with 61,610 the previous week and 34,570 in the corresponding week of a year ago, according to Ward's Automotive Reports. The trend will continue normally downward for the next two weeks, with the bottom point expected early in August. Plants not involved in strikes are rushing to get into production on new models.

Chrysler plants cleaned up current runs with an output of 5900, against 18,320 the previous week. Plymouth turned out its last 1600 cars of the year, compared with 9000 the previous week. General Motors' production held steady at around 18,450 with Chevrolet again accounting for 17,500. Ford showed a slight decline to 17,000 (including 500 Zephyrs) from 18,500.

Packard, which started production on 1940 models two weeks ago, is reported to have assembled around 800 of the new cars. The general anticipation that Packard's new lighter car

THE BULL OF THE WOODS

BY J. R. WILLIAMS



(mentioned last week in the Assembly Line) would be released this year doesn't seem to measure up with all the facts. Available information indicates that while the project is still alive, production in the first few months of the new model year, at least, will not include the light car.

GM Purchasing Department Moves

Elevator operators have almost been forced to issue transfers since the purchasing department of General Motors moved its headquarters. The move is very recent, so many visitors still get off at the 14th floor of the General Motors Building in Detroit and get all the way to the end of the long hall before they find out that they will have to go back to the center of the building to ride up one more floor, or climb the stairs. The purchasing division is occupying a wing of the building at 15-162, having moved to provide for consolidation of legal department activities in the previous purchasing quarters on the 14th floor.

Superfinish Aids Engine Tests

Superfinish, Chrysler mechanical development, is a never-ending story. Latest development is a phenomenal reduction in engine test time. Other automobile plants are still running new engines 45 minutes to an hour, generally with electric motivation; then the engine pan is removed for cleaning, inspection, and sometimes tightening bearings, etc. It has been learned that Chrysler has initiated a new practice which will prevail through 1940 and future models. Engines are now run only about five minutes—long enough to get hot oil through the entire lubrication system—then the engines are put on the dynamometer for power check and inspection. The fact that Superfinish removes all the initial roughness of surfaces in the engine is credited with this remarkable economy. Chrysler production authorities have assured themselves through tests that the "wear in" period is eliminated when the surface finishing method provides an ultimate bearing surface before the engine is assembled.

Manufacturing economy is obvious. Probably no plant could conduct run-ins of engines and partially tear them down for inspection without an overall cost (wages and overhead) of more than \$2 an hour, according to an authority on the subject.

One of the earliest press previews of recent years has been announced by Packard which will demonstrate its 1940 cars to a large gathering of newspaper men and trade paper editors on Tuesday, Aug. 8. The Studebaker initial showing will be held shortly after—on Aug. 15 at South Bend.

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THIS WEEK IN WASHINGTON

... Railroads opposed to Government purchases of equipment ... A sweeping investigation of Labor Board assured by overwhelming vote in House ... Question of export embargo on scrap for Japan is deferred until next January ... Philip Murray, SWOC head, opposes changes in Wagner Act, while a subordinate says, "We'll strike."

By L. W. MOFFETT
The Iron Age

WASHINGTON—Provision in the new spend-lend program authorizing the RFC to buy equipment to be leased to the railroads was described last week by a spokesman for the Association of American Railroads as "the wrong approach" and by a member of the Interstate Commerce Commission as containing the danger that rapid developments make it seem likely that railroad equipment purchased today may be out of date five years from now.

President J. J. Pelley, of the Association of American Railroads, told the Senate Banking and Currency Committee shortly before hearings were completed on the Barkley bill that "the easy way and the most effective way of carrying out the purposes of the bill—and we are sympathetic with that—is simply to put the money within reach of the railroads and let them come and get it."

As for the current need for additional railroad equipment, Mr. Pelley reported that the railroads could handle 20 to 25 per cent more business with present equipment and that after repairing they could handle 40 per cent more business; that the railroads now have 2999 good locomotives and 200,000 freight cars "waiting for more business." He added, however, that "if we had the money we would buy more modern equipment enabling the roads to operate more economically."

To the Pelley recommendation that the roads be free to purchase their own equipment, Senate Majority Leader Barkley, sponsor of the bill, responded by moving to revise his measure so that outright equipment loans would be allowed, permitting

roads to buy new equipment direct if they so desired and without the necessity of adhering to any design specification suggested by the RFC.

Roads Want Easier Terms

Mr. Pelley reminded the committee that the RFC has loaned money to the railroads with which new equipment was purchased by them and that it still has that power. It was his opinion that, in order to stimulate the further purchase of equipment, terms will have to be relaxed but in this respect he expressed the view that the RFC already has authority to do that. He made no complaint of the 4 per cent RFC loans made several years ago to various roads but doubted that loans today could be made in that basis. It might help, he told the committee, if Congress declared itself in favor of a policy that would "enable the roads to get Government money at no expense to the Government but not to make a big profit out of the money."

Authorities differ as to what the interest rate would be under the spend-lend program but estimates have ranged from 2.3 per cent, the long term interest rate on Government bonds, to 2.75 per cent; and some members of Congress have even gone so far as to insist that the railroads can get lower interest rates today from the RFC than they could under the pending bill. Mr. Pelley agreed with several Senators that the RFC is ready to loan money at "a good deal less than 4 per cent," pointing out that he had heard Mr. Jones say recently that he had some railroad money available at 2 per cent.

The railroad spokesman expressed

grave doubt that the roads will want to lease the equipment purchased by the RFC as provided in the bill but he readily conceded that "if you make the terms sufficiently attractive you will get some orders."

Says Equipment is Needed

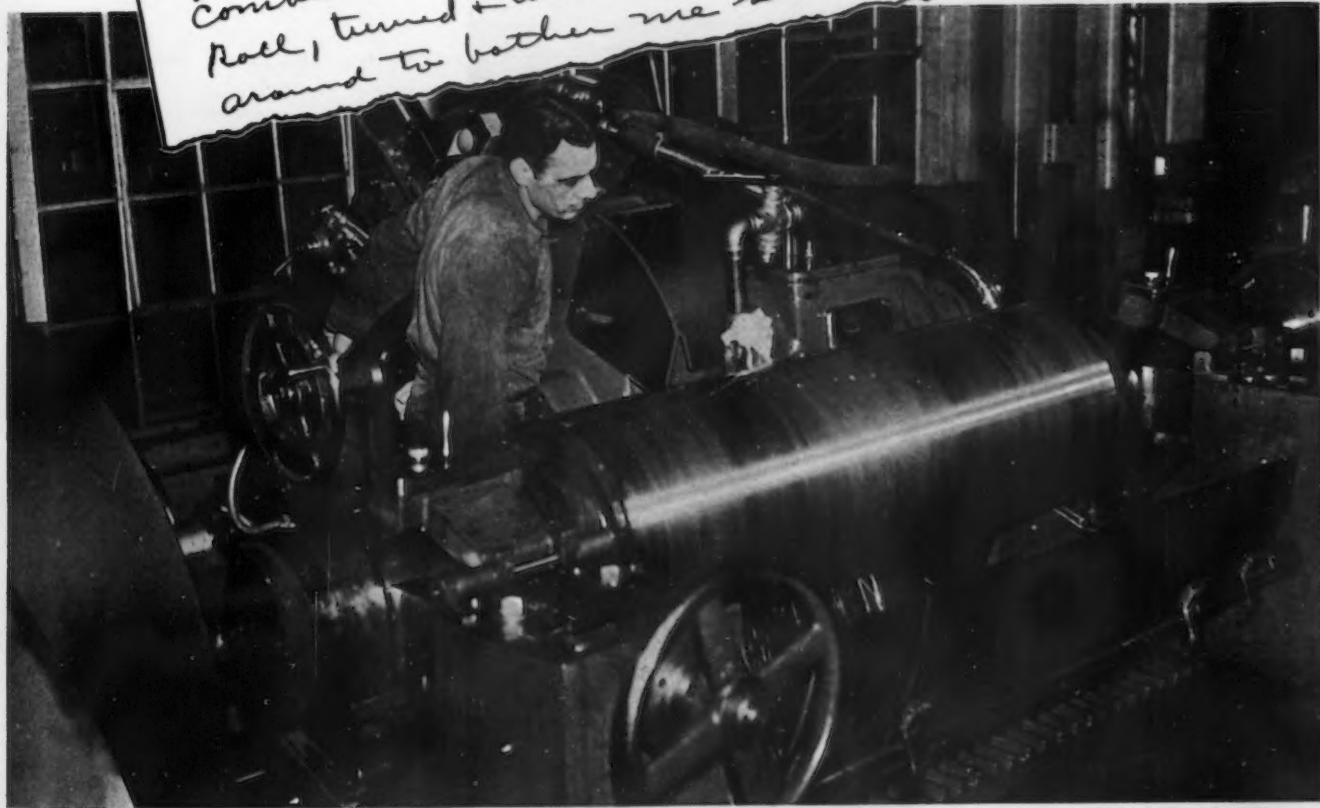
The committee heard testimony from Joseph B. Eastman, ICC chairman, that while the roads need a relatively large amount of new equipment the measure should be revised so that the RFC could not buy equipment except upon railroad specifications and only in the event there is a firm commitment for the use of that equipment by the railroad. The latter requirement, in the opinion of some observers, might negate the whole railroad equipment part of the program in view of other testimony given the committee. The danger in the plan for Government purchase of equipment is that rapid developments makes it seem likely that equipment purchased today may be out of date five years hence, Eastman said.

His estimate that a relatively large amount of new equipment is needed was based upon experience gained as Federal Coordinator of Transportation from 1933 to 1936 and as a member of the so-called committee of three which reported on the railroad problem last year, at which time \$300,000,000 was the amount recommended as a likely sum for new equipment. The \$500,000,000 originally proposed in the pending bill "probably would not be too much if traffic continues to increase as it has been recently," he said, explaining that savings would come in reduced operating expenses and in attracting new traffic through streamlining and other methods.

The railroads now have three different means for financing equipment acquisitions: (1) Conditional sale or leasing arrangements with the equipment supply companies; (2) sales of equipment trust certificates; and (3) loans from the RFC. Mr. Eastman described equipment trust loans as a sound method of financing, said he knew of no railroad unable to borrow by that method now provided it is able to furnish the cash for a down payment, and agreed with Senator Townsend, Republican, of Delaware, that there is "nothing to prevent the RFC from lending Government money to any of the roads." Whether there is the need for additional methods over

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and above existing means for financing the acquisition of new equipment, Mr. Eastman said that while he had not made a thorough study of the subject, he was "quite ready to believe that under the proposed bill more favorable arrangements might be made for certain railroads under certain circumstances and without danger to the Government."

Government Purchases Opposed

He denied that he would like to see the Government get into the business

of buying equipment as a permanent proposition but emphasized that "we are in unusual times." Senator Glass, anti-New Deal Democrat, of Virginia, interjected the warning that if the Government ever starts it will "stay in the business." Mr. Eastman told the committee he would be "quite willing" to give to a man like Federal Loan Administrator Jones such power as the bill seeks to vest in the RFC but he was reminded by several Senators that the former RFC chairman

presumably does not have the direct control he formerly had over RFC since being designated to head the new loan agency. Mr. Jones, in the words of Senator Glass, "has had a white feather stuck in his cap and has been lifted up to an honorary place."

The ICC chairman, who said that aside from suggesting the inclusion of shop equipment with rolling stock in the measure he had nothing to do with drafting the bill, could shed no light as to why section 8 (d) was written into the measure authorizing the RFC to "enter into contracts for the purchase of old railroad equipment for the purpose of lease or resale in its existing state or for the purpose of rebuilding, repairing or scrapping the same for lease or resale." It was recalled, however, that the provision is similar to a proposal advanced just a year ago by Senator Henrik Shipstead, Farmer-Laborite, of Minnesota, except that his idea was confined more exclusively to the scrapping of equipment.

Selling second-hand equipment to foreign countries under the provision has been discussed in some Congressional circles but has been generally frowned upon as an unsatisfactory method, and Jesse Jones has described a plan of offering railroads a trade-in allowance, representing a higher figure than the scrap value, on their old equipment and giving WPA labor the job of scrapping the trade-ins and salvaging the scrap. The difference between the scrap and trade-in value would be made up by charging the railroads a slightly higher rate of interest.

A Threat to Scrap Industry

The Federal Loan Administrator's announced plans, made shortly after he had been sworn in on his new job, was looked upon in some quarters as a threat to the scrap industry, reasonably calculated to depress scrap prices. The prospect of a particular disturbing effect upon the market was believed inherent in the plan because the railroads now constitute the principal source of No. 1 heavy melting scrap.

Commenting on this phase of the program, Edwin C. Barringer, executive secretary of the Institute of Scrap, Iron and Steel, Inc., said:

"If any large-scale car scrapping program is undertaken, it is logical that it should be prosecuted as nearly as possible through normal trade channels in order to net the greatest possible return to the railroads and to disturb the scrap trade the least.

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Scrap iron yards are now operating at only 50 per cent of capacity; many of their workers are on relief or employed on WPA projects; to turn the scrapping program over to interests adequately equipped and experienced would provide just as great a volume of employment as to set up new machinery and would net the railroads a greater return and at the same time enable the steel mills to obtain this distributed scrap at a reasonable price. The hazardous character of demolishing railroad equipment alone suggests that the project be entrusted to skilled employers and employees."

Lending Plan Favored

Mr. Jones said he recognized the contention of the railroads that the Government should lend money to the roads for equipment purchases rather than the leasing arrangement but added that it was his idea to make the plan adaptable to the poorer railroads so that they could buy equipment on what is tantamount to installment payments. Both Mr. Jones and Mr. Pellew went on record in favor of an amendment to provide for loans to railroads to allow them to buy their own securities at a discount. If such an amendment were passed, Mr. Pellew promised, "the railroads would then turn to the purchase of more equipment."

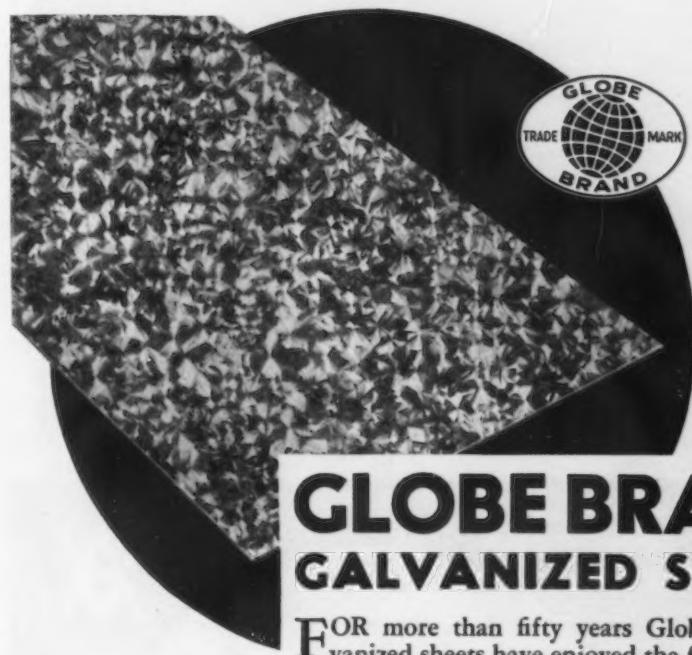
Under the Government purchase and leasing provision of the measure, it has been suggested that the Government could combine the orders of several railroads and thereby obtain a lower price than if the railroads purchased individually, but Mr. Jones, who will continue to be at least the nominal head of the RFC, has said that it was not his intention to buy equipment in huge lots. His explanation was that the plan would apply only to individual railroads negotiating with equipment manufacturers for their special needs who would ask the RFC to finance the deals.

The Senate Banking and Currency Committee has since voted to cut \$400,000,000 from the Barkley bill. The lending authorization for railroad equipment was pared from the \$500,000,000 originally proposed to \$350,000,000, and the \$750,000,000 proposed for toll roads, tunnels and bridges was reduced to \$500,000,000. At the same time a \$90,000,000 authorization was added for reclamation projects at the request of Senators from the West who had expressed fear that the bridge and highway phases of the program would give too much of the gravy to the East.

Inquiry Proposed for Farm Implement Industry

WASHINGTON—The temporary National Economic Committee would be directed to study and make recommendations for legislation aimed at ending so-called monopolistic practices in the agricultural implement and machinery industry under a resolution introduced in the House by Representative Gossett, Democrat of Texas.

Although the Congressman conceded that certain facts concerning the industry had been "conclusively established by investigation of the Federal Trade Commission," he did not elaborate as to why he thought another inquiry would be necessary. The FTC said in a 1000-page report to Congress a year ago that the bulk of production in the industry was concentrated in the hands of a relatively small number of manufacturers. The inquiry cost \$150,000.



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Philip Murray Opposes Changes In the Wagner Labor Act

WASHINGTON — Appearing last week before the House Committee on Labor, Philip Murray of the Steel Workers' Organizing Committee vigorously opposed amendments to the National Labor Relations Act. He lauded his Congress of Industrial Organization affiliate for what he said was a collective bargaining development unparalleled in American industrial and labor history. Asserting that up to the present three-fourths of the steel industry has followed the lead of the United States Steel Corp. and embarked upon a new cycle of industrial relations, Mr. Murray was warm in his praise of the cooperative spirit of steel companies having SWOC contracts. For those that have not come into the SWOC fold he had bitter words. Condemnation of them was matched only by a scorching attack on the American Federation of Labor for seeking changes in the act by providing for craft unit

rule. Amendments proposed by industry and members of Congress likewise were the object of strong opposition.

The committee was told by Philip Clowes, SWOC subregional director in Allegheny county, Pa., that "we'll give you a fight" if the Wagner Act is amended. The act, he declared, had made steel workers "living, breathing personalities, and not just cogs in a machine."

Asked by Representative Bruce Barton, Republican of New York, if he didn't believe Congress will legislate in the interests of the country, Mr. Clowes replied defiantly that "if there are amendments, we'll give you a fight."

"You'll strike?" inquired Mr. Barton.

"Yes, we'll strike. Now we have industrial peace and freedom and we won't give it up."

Representative Heinke, Republican

of Nebraska, inquired of Mr. Clowes whether he would object to an amendment permitting employers to petition for an election, a "privilege" recently granted by the NLRB under pressure of public opinion.

"What does an employer want with an election?" Mr. Clowes asked. "I know more about this than you men around the table. The employer wants an election to destroy the union. He can have the kind of labor relations he wants and if he wants a fight he'll get it."

Taking a shot at the AFL move for amendments, Mr. Clowes said that if employers succeeded in "destroying industrial unions, they'll go to work on craft unions and would have a much easier time of it."

Bert Hough, chairman of the Industrial Union Council at Beaver, Pa., said that "every labor-hating agency in the country is in collusion with William Green," AFL president.

"Discard Green and his blatherings about the Wagner Act," he admonished the committee. "Discard the good intentions of uninformed crackpots who don't understand the act."

If the amendments had been law when the Wagner Act was enacted in 1935, Mr. Murray said, strikes would have been general throughout the steel industry. Even under the act as it stands there would have been more strikes, Mr. Murray indicated, had not the SWOC prevailed upon its members to remain at work. Mr. Murray said that nearly every one of the 200 charges filed by the SWOC with the NLRB was a substitute for a strike. The "Little Steel" strike of 1937 was said to have resulted first from the mass persecution of union workers and secondly from the demand that freedom from this persecution be guaranteed by a signed contract similar to that SWOC negotiated with the United States Steel Corp. Mr. Murray conceded that in the "Little Steel" strike some of the strikers did overstep the law but he said they were promptly punished for their transgression.

Mr. Murray divided his exhaustive testimony of 23 single-spaced legal size pages into three parts. The first portion went back, as he outlined them, to labor relations in the steel industry beginning with the "bloody, Homestead, Pa., strike of 1892" and led through a brightly painted sketch of peaceful accomplishments of the SWOC, the purpose being to show that until its organization there had been

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no worthwhile collective bargaining in the industry. The second part dealt with collective bargaining efforts which have been submitted to the NLRB for final disposition. The third section was devoted to an attempt to show what would have happened if pending proposed amendments had been incorporated in the original act.

Organized Opposition to Changes

The testimony of Mr. Murray was a part of an organized opposition to changes in the law staged before the House Committee by Labor's Non-Partisan League. It was designed to offset testimony by industrial interests and members of Congress for amendments. Included in the testimony urging changes in the act was that given recently before a subcommittee of the Senate Committee on Education and Labor by Walter S. Tower, executive secretary of the American Iron and Steel Institute, which represents 90 per cent or more of the industry. Hence, despite Mr. Murray's representation of peaceful development of collective bargaining in the industry, it nevertheless, unlike SWOC, definitely wants the act amended and fairly administered.

The new cycle of industrial relations in the steel industry, Mr. Murray said, has been encouraged and guided by the policy of the Federal Government as administered by the NLRB since July 5, 1935. Administration of the policy, however, Mr. Murray said, was "delayed and impeded by the gratuitous opinions of self-appointed kangaroo courts until the Supreme Court of the United States validated the National Labor Relations Act on April 12, 1937, twenty-one months later." (The court upheld the constitutionality of the act in the Jones & Laughlin Steel Corp. decision on the date mentioned.) Mr. Murray said that the Jones & Laughlin election of 1937 which resulted in recognition of SWOC is still the largest election conducted by the NLRB and that it represents perhaps the greatest victory of reason over strife in American industrial life.

"The Congress and President are to be congratulated for the enactment of the National Labor Relations Act, which has made this great achievement of democracy over autocracy possible," Mr. Murray told the committee.

Discusses U. S. Steel Contract

Declaring that progressive management had become influenced by the National Labor Relations Act and its predecessor, section 7 (a) of the Na-

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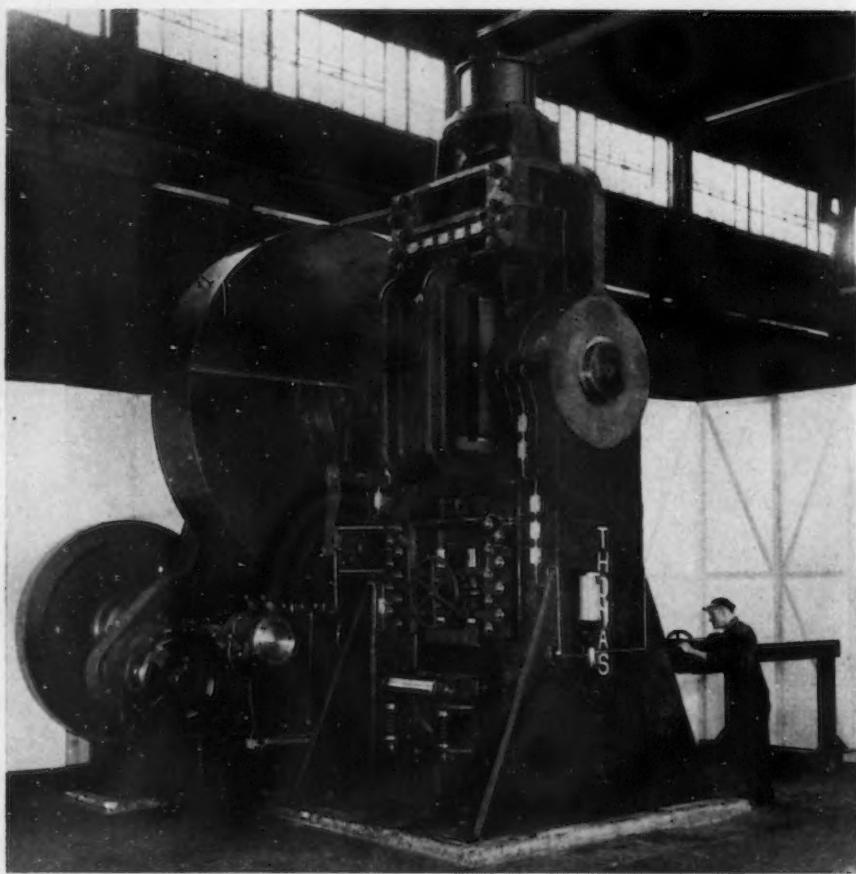
tional Industrial Recovery Act, Mr. Murray said that among these new leaders was Myron C. Taylor, former chairman of the United States Steel Corp. Mr. Taylor was described as having been interested in the problems of the steel industry as a whole and as having realized the importance of sound labor relations. Mr. Murray proceeded to tell of the signing on March 2, 1937, of the Carnegie-Illinois-SWOC preliminary recognition contract, followed shortly afterward by identical contracts with other U. S.

Steel units. This development, which Mr. Murray said marked the first time Steel Corporation was under contract for all its producing subsidiaries at the same time and with the same union, was pointed to as leading to widespread recognition of the SWOC by the steel and related industries. Mr. Murray said that in less than three months — from March 2 to May 25, 1937 — the SWOC had entered into contractual relations with 142 former non-union steel and fabricating and processing firms employing approx-

imately 375,000 workers. These contracts were declared to have been negotiated peacefully in more than 95 per cent of the instances. It was stated that by January, 1938, the number of companies under SWOC contracts was 463. Members of SWOC, Mr. Murray stated, are organized into 1100 lodges or local unions on the basis of one for each plant.

Mr. Murray bitterly assailed as violators of the Wagner Act steel companies which have not recognized SWOC. He declared that despite the "ill-advised and futile" efforts of "misguided" steel employers, a majority of the steel workers and steel employers of the country now determine their relationships by democratic means. SWOC, he said, was doing its part to bolster democracy in America and Congress was told not to do anything to frustrate this development or to "encourage the decaying seeds of the old autocracy."

He did not confine his attacks to individual steel executives who have incurred his dislike. Mr. Murray also struck at AFL leaders, as, when he stated that their charges of NLRB CIO-bias, "sound like so much downright, rotten, sour grapes."



The Formula for "Shear Power" as derived by THOMAS:

Capacity: 9"x9" Mild steel (cold)
Ram Pressure: 5,000,000 pounds
Construction: Cast steel insuring rigidity
Clutch: Air operated
Crankshaft: Alloy steel
Lubrication: Centralized system

THOMAS
MACHINE MANUFACTURING COMPANY

PITTSBURGH, PA.

Link-Belt Co. Organizes A New Subsidiary

CHICAGO — The Link-Belt Co. has organized the Link-Belt Speeder Corp., a wholly-owned subsidiary but operated independently, with headquarters at 301 West Pershing Road, Chicago, for the manufacture of power-operated excavating and materials handling shovels, draglines, cranes, including a full line of track-type locomotive cranes.

A few months ago the consolidation was announced of the Speeder Machinery Corp., Cedar Rapids, Iowa, and the shovel division of Link-Belt Co., Chicago, which now become the Link-Belt Speeder Corp. The products of the new corporation will be manufactured both at Cedar Rapids and Chicago.

The directors have elected the following officers: Alfred Kauffmann, chairman of board; T. M. Deal, president; Walter Baker, vice-president; W. C. Carter, vice-president; H. E. Kellogg, treasurer; G. H. Olson, secretary; O. A. Prather, assistant secretary; H. E. Kellogg, assistant secretary; and F. V. MacArthur, assistant treasurer.

Question of Embargo on Scrap Exports To Japan Deferred to January

WASHINGTON—By declining to express an opinion on whether the Pittman proposal to embargo certain exports to violators of the Nine Power Pact would be a violation of other existing treaties, Secretary of State Cordell Hull has deferred until next January the answer to the question: "Has the State Department changed its previously expressed opposition to proposals for licensing the exportation of scrap iron and steel?" Asked by Senator Key Pittman, Democrat, of Nevada, and chairman of the Senate Foreign Relations Committee, to give an opinion on his proposed resolution, Mr. Hull replied that since action on neutrality legislation had been deferred until next session it would be best to wait until next January before discussing the Pittman resolution further.

The original resolution was introduced in Congress last April but was revised a few weeks ago by Senator Pittman so that the President would be empowered to restrict certain exports to countries violating the Nine Power Pact, which covers policies to be followed in China by the nine signatories. The original resolution gave the White House power to restrict or prohibit both the export and import of "certain commodities, articles and materials." The amended resolution, however, specifically listed arms, ammunition and implements of war, as defined in the present neutrality act, and "iron, steel, oil, gasoline, scrap iron, scrap steel, and scrap metal containing a combination of iron or steel and other metals or any combination of metals."

Regarded as Treaty Violation

Statements that such an embargo, obviously aimed at Japan, would be in violation of the 1911 treaty of commerce and navigation with Japan prompted Senator Pittman to ask an opinion from the State Department. Although the Secretary of State did not choose to reply, there have been reports that many State Department officials regard such an embargo as a direct violation of the 1911 treaty.

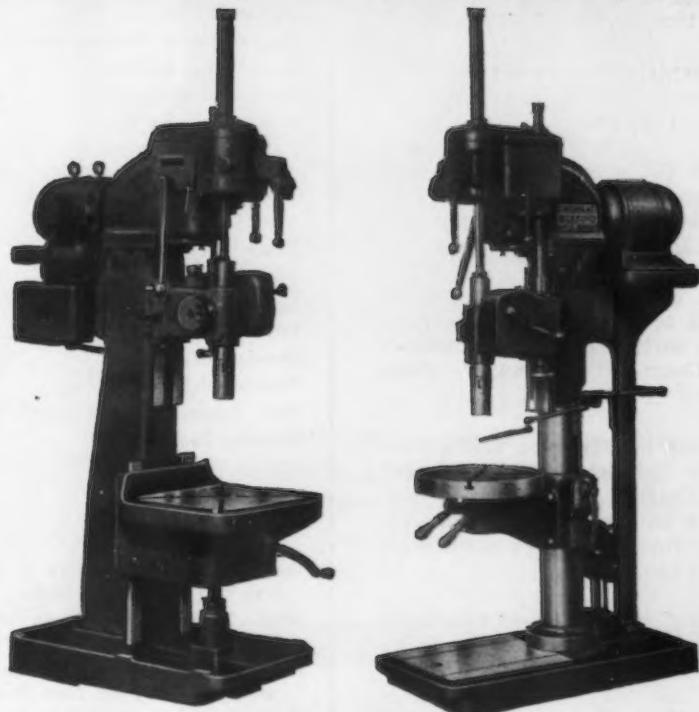
The subject of scrap licensing was recently revived when reports became current that a scrap licensing plan designed on a quota basis was being discussed in high Administration quarters. Opposition to similar proposals embodied in several bills intro-

duced in Congress previously had been registered by the State Department and in view of rumors that public sentiment was undergoing a change on the subject the State Department had been looked to as holding the key to reports that export restriction on scrap was again in the

wind. If Mr. Hull reports in January that passage of the Pittman resolution would be in violation of the 1911 treaty, presumably future scrap licensing proposals would be similarly classified.

There have been indications that there is a growing sentiment in Congress for imposing restrictions on such exports, although it is generally conceded that whether sentiment will crystallize depends on subsequent developments abroad.

All geared 21" 24" and 28" SUPER SERVICE UPRIGHTS



More holes per dollar!

Greater productive capacity, adaptability, reliability, accuracy, convenience and economy available in Super Service Uprights assure "More Holes per Dollar."

Cincinnati Bickford invites the most searching comparison of these modern machines with other drilling machines. We are confident your analysis will convince you that Super Service Uprights offer maximum return in production per dollar of investment. The Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio, U.S.A.

CINCINNATI BICKFORD

THE NEWS IN BRIEF

Foundation being laid for broad economic upturn, says Alfred P. Sloan, Jr., chairman of General Motors Corp.—Page 49.

Continuance of strike of tool and die workers delay of production of new models by General Motors.—Page 50.

Changeover to new models cuts automobile production to 47,420; low point to come in about a week.—Page 52.

Railroads opposed to Government purchases of equipment.—Page 54.

House bill proposes another investigation of farm implement industry, this time by TNEC.—Page 57.

Philip Murray, chairman of the SWOC, opposes changes in the Wagner Act.—Page 58.

Link-Belt Co. organizes a new subsidiary to manufacture power-operated excavating and materials handling equipment.—Page 60.

Question of embargo on exports of scrap to Japan believed to have been postponed until next session of Congress in January.—Page 61.

A sweeping investigation of National Labor Relations Board is assured by House vote of 254 to 134, which authorizes creation of five-man investigating committee.—Page 64.

Government iron and steel awards in week ended July 15 amounted to \$275,797.—Page 65.

Machine Tool Congress plans fall meeting.—Page 67.

Communists can't seize steel union SWOC secretary says.—Page 68.

Fawick General Co. organized at Akron, Ohio, to manufacture new rubber clutch for automobiles, machine tools, conveyors and other industrial applications.—Page 68.

American Zinc Co. to rebuild its sulphuric plant at East St. Louis, Ill.—Page 68.

Marketing council formed in western New England.—Page 69.

Baldwin-Southwark Corp. awarded \$320,000 order.—Page 69.

Republic Steel Corp. to build iron ore concentration plant at Port Henry, N. Y.—Page 69.

Reynolds Wire Co. will add 60,000 sq. ft. to its plant at Dixon, Ill.—Page 69.

Tata Iron & Steel Co. of India buys two Lewis three-high sheet mills.—Page 69.

American Carbide Alloys Corp., subsidiary of Firth-Sterling Steel Co., elects officers; will be located in Detroit.—Page 71.

New booklet describes protective coating.—Page 71.

General Electric sales up 32 per cent this year.—Page 71.

Crucible Steel Co. of America salutes the aviation industry in a special booklet.—Page 72.

1938 strikes caused a loss of 9,148,273 man-days.—Page 72.

La Follette labor practices bill reported favorably by Senate Education and Labor Committee.—Page 73.

CIO union wins bargaining election at plant of Vanadium Corp. of America.—Page 73.

Tin can sizes may be simplified by voluntary action through assistance of Bureau of Standards.—Page 73.

Polish steel problem is settled by cartel.—Page 73.

New company in Detroit to compress sheet strip.—Page 74.

Washing machine shipments gain over last year.—Page 74.

Weirton Steel Co. places order for Westinghouse new high speed drive for cold reduction strip mill.—Page 74.

Bethlehem sheet mill at Lackawanna rolls 1845 tons in 8 hr., said to be a record.—Page 74.

Youngstown Sheet & Tube Co.'s profits in the second quarter were \$329,086.—Page 74.

United States Navy may spend \$6,000,000 to equip private armor plants.—Page 74.

July machine tool sales holding up well as compared with the June volume. Summer business ahead of expectations in some quarters. Diversification of sources a feature of present market.—Page 91.

Woodward Iron Co. ordered to hold employee election.—Page 91.

Commercial steel users in England hampered by large government requirements.—Page 91.

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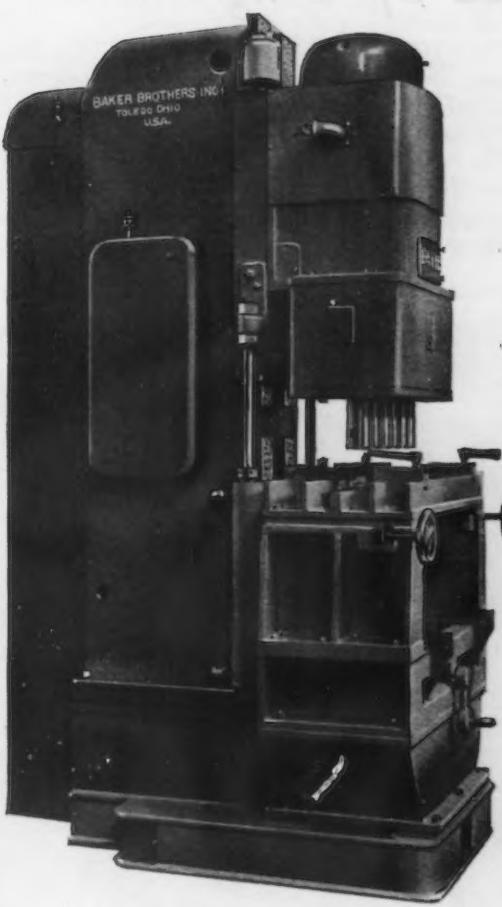
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MEETINGS

Aug. 28 and 29—Institute of Scrap Iron and Steel, Cleveland.
Aug. 28 to 31—American Mining Congress, Salt Lake City.
Sept. 4 to 8—British-American Engineering Congress, New York.
Sept. 8 and 9—American Ceramic Society, Conneaut Lake, Pa.
Sept. 20 to 22—National Industrial Advertisers Association, New York.
Sept. 26 to 29—Association of Iron and Steel Engineers, Pittsburgh.
Oct. 4 to 13—National Machine Tool Builders' Association, Cleveland.
Oct. 5 to 7—Society of Automotive Engineers, aircraft production meeting, Los Angeles.
Oct. 16—Society of Automotive Engineers, annual dinner, New York.
Oct. 16 to 20—National Safety Congress and Exposition, Atlantic City, N. J.
Oct. 23 to 27—National Metal Congress, Chicago.
Nov. 16 and 17—Porcelain Enamel Institute, New York.

HOW TO SPELL

Efficiency
IN 5 LETTERS



No. 30-HO Motor on saddle type machine with six spindle preloaded ball bearing multiple head, arranged to chamfer both top and bottom of cylinder bores.

Selection of Baker machine tools for your drilling, boring or tapping operations will help you to lower costs and increase quality production.

Precision engineering and a long background of successful experience are built into every Baker

machine. Baker efficiency brings better results more economically.

Inquiries invited. Send blue prints or sample parts today for expert recommendations.

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★ BAKER ★

Sweeping Investigation of N.L.R.B. Assured by Congressional Vote

WASHINGTON—A sweeping House investigation of the National Labor Relations Board was assured this week as protests appeared to be mounting against other quasi-judicial agencies.

Over the opposition of loyal Administration supporters, the House voted

254 to 134 for the resolution proposed by Representative Smith, Democrat, of Virginia, which authorized the creation of a five-man investigating committee with full subpoena powers to conduct a comprehensive probe of Labor Board activities and to make a committee report to Congress with recom-



an assist! By ATLAS
View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.
Engineers CLEVELAND, OHIO Manufacturers

serving the world with mobile handling equipment

mendations for legislative changes.

At the same time, sentiment that the NLRB and other Federal quasi-judicial agencies, which have mushroomed to prominence in the last six years, would have to be curtailed in their strong-arm methods of handling public business sent the chances for House passage of the Logan bill soaring. Sponsored by Senator Logan, Democrat, of Kentucky, and Representative Walter, Democrat, of Pennsylvania, the bill would require public hearings before any administrative agency issued an order. Any person showing injury by reason of any action taken could then petition a Federal court, asking that a determination be made as to whether the step was within the bureau's authorized authority. The bill already has been reported favorably by the House Judiciary Committee.

The Justice Department is understood to be opposing the measure, and countless other administrative agencies are fearful that if it becomes law their cherished activities will be abruptly brought to a complete standstill. They are leaving no stone unturned in their battle to kill the measure, which caught Senate Majority Leader Barkley unawares when it was passed by the Senate.

Duties of Committee

Under the approved resolution to investigate the NLRB, the five-man House committee will have the job of:

1. Determining whether the board has been fair in interpreting the law and in making decisions.
2. Studying the effects of the Wagner Act on employer-employee relations and on general economic conditions.
3. Determining whether the board has tried to write into the law interpretations unjustified by the act's provisions.
4. Proposing to Congress any legislation found necessary and ascertaining if a new definition of interstate commerce should be drawn up.

In addition the committee can subpoena witnesses and documents, hold hearings wherever it desires and can study labor board personnel and make any recommendations found necessary.

Representative Cox, Democrat, of Georgia, and ranking member of the House Rules Committee, told the House during debate on the measure that the Labor Board has "missed no opportunity to use compulsion to

bring about the unionization of industry."

"In its zeal to serve certain labor leaders and to direct the labor movement according to its own notion and its own social and economic theories, the board has brought itself and the law into thorough disrepute, has sacrificed much public goodwill for the cause of organized labor, has failed utterly to achieve the avowed objective of the act, and has frustrated instead of carrying out the will of the majority in many cases involving thousands of workers," Cox said. "It has prevented collective bargaining and the democratic management of the affairs of the workers. Preaching economic democracy, the board has moved steadily toward compulsory unionization in unions chosen by the board."

Representative Anderson, Democrat, of Missouri, bitter opponent of the Labor Board and sponsor of bills to revise the Wagner Act and to investigate NLRB functions, recalled the NLRB case against the Douglas Aircraft Corp., pointing out that the board had ordered the company to rehire sit-down strikers even after several had been convicted of felonies. The Congressman charged that the board had frequently "distorted the evidence so as to make its decisions seem logical."

The authorized investigation of the board was arranged by the House Rules Committee by reporting out the Smith resolution. Several members protested that the Labor Committee, which normally would handle such a move, was stalling on pending bills calling for revision of the Wagner Act.

Government Iron and Steel Awards \$275,797 in Week

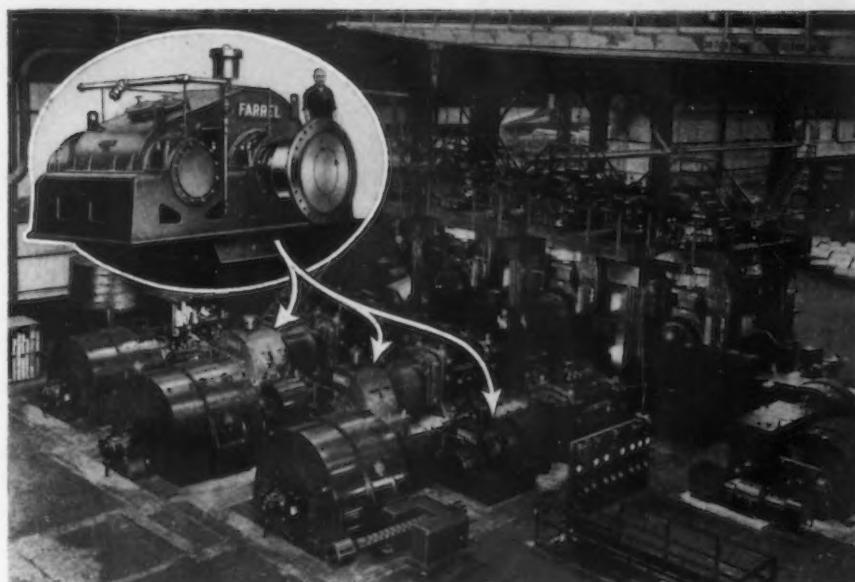
WASHINGTON — Government contracts for iron and steel products, as reported by the Labor Department's Public Contracts Division for the week ended July 15, amounted to \$275,797. For the same period contracts for nonferrous metals and alloys totaled \$39,309 and contracts for machinery amounted to \$1,397,558. Details follow:

Iron and Steel Products	
Heppenstall Co., Pittsburgh, shafts, propeller, steel	\$18,363.50
U. S. Pipe & Foundry Co., Birmingham, Ala., pipe, water, cast iron	10,027.08
Lynchburg Foundry Co., Lynchburg, Va., C. I. water pipe	10,302.90
Carnegie-Ill. Steel Corp., Pittsburgh, shapes, steel	47,600.00
S. G. Adams Metalware Co., St. Louis, plate, photographic ferro-type	10,470.00

Worth Steel Co., Claymont, Del., steel, plates, sheets, etc.	22,383.31	Revere Copper & Brass Co., New Bedford, Mass.; Baltimore, Md., copper tubing	10,838.72
Central Iron & Steel Co., Harrisburg, Pa., steel, plates, sheets and strips	10,812.50	General Fire Truck Corp., Detroit, fire extinguishers	Indefinite
Midland Structural Steel Co., Cicero, Ill., bridge	23,389.00	Phister Mfg. Co., New York City, fire extinguishers	Indefinite
Butler Mfg. Co., Kansas City, Mo., steel shelters	34,001.10	Pyrene Mfg. Co., Newark, N. J., fire extinguishers	Indefinite
Belmont Iron Works, Philadelphia, superstructure	22,122.00		
Mine Safety Appliance Co., Pittsburgh, tools, portable, powder, actuated	22,141.88	Machinery	
Great Lakes Steel Corp., Detroit, steel	12,625.00	Allis Chalmers Mfg. Co., Milwaukee, tractors	41,375.65
Carnegie-Ill. Steel Corp., Chicago, steel	31,559.24	Int'l Harvester Co., Inc., Chicago, Ill., tractors	25,751.00
	28,171.00	R. G. LeTourneau, Inc., Peoria, Ill., tractors	17,935.50
		Cleveland Tractor Co., Cleveland, Tractors	10,595.34
		Allis-Chalmers Mfg. Co., Milwaukee, tractors	11,715.00
		Int'l. Postal Supply Co., Brooklyn,	

Non-Ferrous Metals and Alloys

American Brass Co., Waterbury, Conn., cartridge brass cups	28,171.00
------------------------------------------------------------	-----------



FARREL GEAR UNITS

Drive 84" Tandem Cold Mill
at New Irvin Works

In the new Irvin Works of Carnegie-Illinois Steel Corporation the 84" three-stand tandem cold reduction mill shown above is driven by three Farrel Gear Units. Two of the stands are powered by 2500 HP motors and the third by a 3500 HP motor.

These drives are typical examples of the advanced engineering and precision construction embodied in all Farrel Gear Units to assure efficient, economical, dependable performance under the most severe operating conditions.

All three drives are single reduction units with cases of all-

welded steel construction which combine greater strength with less weight. Gears are continuous tooth herringbone, accurately generated by the Sykes process. Oil is supplied to gears and bearings by a central lubricating system. Built-in sprays lubricate the gears and the bearings are flood lubricated. To prevent oil contamination, dirt and moisture are trapped by breathers mounted on the covers.

Farrel Gear Units are built in any capacity for every type of service. When you have a drive problem ask to have a Farrel engineer consult with you on your requirements.



New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

N. Y., canceling machines and pick-up tables	50,000.00
Int'l. Harvester Co., Inc., Milwaukee, tractors	13,593.72
C. H. Gosiger Machinery Co., Dayton, Ohio, lathes	20,599.78
Kearney & Trecker Corp., Milwaukee, milling machines	33,979.50
A. B. Farquhar Co., Ltd., York, Pa., hydraulic press	20,610.00
National Acme Co., Cleveland, spindle machines	14,647.50
Brown & Sharpe Mfg. Co., Providence, screw machines	19,396.36
Ex-Cell-O Corp., Detroit, machine, shell turning	26,849.60
Stedfast & Roulston, Inc., Boston, drilling and milling machine	12,135.00
Harnischfeger Corp., Milwaukee, shovel	20,065.00
R. Hoe & Co., Inc., New York City, printing presses	184,200.00
Edwards Mfg. Co., Longview, Wash., gasoline pumbers	16,508.65
Harris-Seybold-Potter Co., Cleveland, perforating machines	98,500.60
Lippman Engineering Works, Milwaukee, rock crushing plant	20,898.00
Caterpillar Tractor Co., Peoria, Ill., tractors and scrapers	19,136.50
Lakeside Bridge & Steel Co., Milwaukee, cranes	266,000.00
Orton Crane & Shovel Co., Chicago, cranes	165,630.00
Cleveland Crane & Engr. Co., Wickliffe, Ohio, bridge cranes	15,942.00
Victor R. Browning & Co., Inc., Willoughby, Ohio, crane	74,900.00
Struthers Wells-Titusville Corp., Titusville, Pa., windlass and capstans	93,842.00
Kent Machine Works, Inc., Brooklyn, N. Y., grinding mills	25,975.00
Proctor & Schwartz, Inc., Philadelphia, drying units	21,360.00
Proctor & Schwartz, Inc., Philadelphia, drying units	25,320.00
Whitin Machine Works, Whitinsville, Mass., textile machinery	13,707.92
Warsaw Elevator Co., Warsaw, N. Y., freight elevator	16,389.00

Spectrochemical Analysis

(CONCLUDED FROM PAGE 24)

the elements under investigation can be determined on one plate. Eastman No. 33, 8x10 in. spectrographic plates are used. After the plates are processed and dried they are examined on a viewing box, as shown in Fig. 6, and the various elements are rapidly estimated by visually comparing the densities of the lines of the unknown samples with those of the standard samples. When closer estimations are desired, the exact intensity of the various spectral lines can be determined on a Bausch & Lomb Densitometer which is located adjacent to the viewing box.

It is believed that this technique for the spectrographic examination of zinc-base die castings gives greater

sensitivity with attendant increase in accuracy and reliability as well as lessening the time consumed in burning samples. Electrodes prepared in the manner described can be impregnated in large quantities and kept indefinitely. They also may be used to advantage in other analyses requiring the use of solution methods.

While the spectrograph is used in the IBM laboratories primarily for the examination of zinc-base material, it is constantly used as an aid to the chemical laboratory to make qualitative analyses which would be time consuming if done by chemical methods. Very often the peculiar behavior of alloys can be explained after a spectrographic examination is made and differences noted. It is believed that as new needs arise, new methods will be devised for spectrochemical analysis which will solve the problem. Just as the problem of the corrosion of zinc-base die castings was entirely eliminated by the intelligent application of spectrographic knowledge, so perhaps some day other corrosion problems, which, today are equally baffling, may be solved by the use of the same instrument.

MCKAY

FULLY MECHANICAL -- FULLY AUTOMATIC -- DRAWBENCHES for



3. RODS FROM THE COIL
(fully automatic). Automatic cut-to-length shear, automatic draw cycle, and automatic delivery of the drawn rod.

Conventional electric drive or automatic AC or DC drive for slow start and acceleration to the drawing speed, optional.

1. TUBES (fully mechanical). Electric tube feed-in device, twin mandrels with air push in and retriever, automatic draw cycle, and automatic steep pitch tube arms.

2. BARS (fully mechanical). Quick change - over for single, double, and triple draw; automatic draw cycle; and automatic steep pitch bar arms.



THE MCKAY MACHINE CO.

ENGINEERS AND MANUFACTURERS OF SHEET, TIN AND STRIP MILL EQUIPMENT

YOUNGSTOWN, OHIO

Machine Tool Congress Plans Fall Meeting

THIRTY representatives of 10 national trade and business organizations met at Schenectady recently as guests of the General Electric Co. for the purpose of planning the program of the Machine Tool Congress to be held at Cleveland in October in connection with the National Machine Tool Show.

Organizations participating in the congress are the National Electrical Manufacturers Association, the American Society of Mechanical Engineers, the American Society of Civil Engineers, the National Foremen's Association, the American Foundrymen's Association, the Associated Machine Tool Dealers of America, the Cleveland Engineering Society, the Society of Automotive Engineers, and the National Machine Tool Builders Association.

The purpose of the Machine Tool Congress is to provide a series of discussions on subjects related to machine tools and mechanization, for the benefit of the visitors attending the National Machine Tool Show and, in addition, for members of the participating organizations.

The Machine Tool Show, Oct. 3 to 14, promises to be by far the most interesting and spectacular in the history of the machine tool industry. "In this year's show, there will appear under one roof the final fruits of the extended program of research and invention which has continued in the machine tool industry throughout the depression years and which has just now reached its fullest development," Wendell E. Whipp, president, National Machine Tool Builders Association and president, Monarch Machine Tool Co., Sidney, Ohio, said. "It is my belief that the manufacturers of this country are going to be amazed at the extent of the improvements in design and productivity on display at this show."

A. C. Danekind, General Electric Co., who is president of the Machine Tool Congress, predicted that the nature and the scope of the speeches and discussions planned for the Machine Tool Congress program would in themselves be sufficient to attract visitors from all over the United States.

Sloss-Sheffield Steel & Iron Co., Birmingham, reported a net income of \$343,591.77 for the first six months of 1939, as compared with \$344,436.67 for the same period in 1938.

*First.. IN
Safety First*

**AN EXCLUSIVE YALE
SAFETY STORY**

Before buying your next chain hoist, give an EXTRA thought to safety—then buy Yale. For Yale features safety advances that can be found on no other hoist.

The EXCLUSIVE Safety Hook for example. Drop forged of special steel, this unique hook gives visible warning when overloaded, opening slowly—without fracture—before any other part of the hoist is strained. Guaranteed to stand up to 150% of its rated capacity without changing dimensions, the Yale hook is a safety valve that cannot fail!

In addition, mechanical perfection is guaranteed by swiveling the hook on heavy duty, totally enclosed ball bearings—and swinging it fore and aft on a cross head. This provides free, easy, and UNIVERSAL movement at any angle.

Only a Yale distributor can supply the Yale Safety Hook. Contact him for free catalogue which gives a full description of the Yale line.

Capacities:
300 lbs. — 40 tons



THE YALE & TOWNE MFG. CO.

PHILADELPHIA DIVISION, PHILADELPHIA, PA., U.S.A.

IN CANADA: ST. CATHARINES, ONT.

Communists Can't Seize Steel Union, SWOC Secretary Says

PITTSBURGH—Agents of the Communist Party would like to turn the Steel Workers Organizing Committee "into an instrument for their own use," David J. McDonald, SWOC secretary-treasurer said here.

"There are people who would like

to use the steel workers union to build a classless society," the union official told the Priest's School of Social Science of Pittsburgh.

"The steel workers do not want to join the Communist Party, nor to be guided by it. They will not subscribe to any political or economic theory

which is anti-union or anti-American."

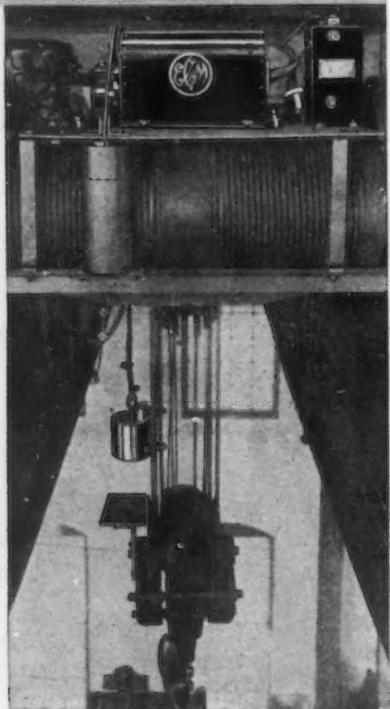
The steel union is not going to "stand for racketeering of any sort and is not going to permit outside domination of its affairs," Mr. McDonald declared. "Any agency which thinks otherwise has no knowledge of the fundamental, decent aspirations and ideals of the American steel workers." He added:

"The SWOC has not stopped with the preaching of unionism alone. It has impressed upon the members of its organization the importance of adhering to fundamental American principles.

"We pray that God will speed us in our work. We pray that God will grant us the strength to contribute just a little bit more toward the happiness of all his people."

EVERY CRANE needs this SAFETY LIMIT STOP

For preventing overhoisting accidents on alternating and direct current cranes—also used for limiting travel of hot metal mixers, tilting furnaces, final skew-limit on ore and coal bridges, etc.



General Purpose Crane with Youngstown Safety Limit Stop



HEAVY DUTY MOTOR CONTROL
FOR CRANES, MILL DRIVES AND
MACHINERY • BRAKES • LIMIT
STOPS • LIFTING MAGNETS AND
AUTOMATIC WELD TIMERS

Every crane needs the Youngstown Safety Limit Stop. Not only is it a check against human error, but it also removes the mental hazard of an overhoisting accident from the operator's mind, thus enabling him to do better work.

Operated directly by the hook block, this Limit Stop not only disconnects the motor from the line, but brings it to a quick stop. And the final stopping point is in no way affected by stretching of the cables.

Make your cranes safe with Youngstown Safety Limit Stops. Ask for Bulletin 1035-B illustrating how this Stop is easily applied to new or old cranes.

THE ELECTRIC CONTROLLER
& MFG. CO.
Cleveland, Ohio

New Company Formed to Make Rubber Clutches

A KRON, OHIO—The Fawick General Co. has been organized to manufacture a newly developed rubber clutch and will be affiliated with the General Tire & Rubber Co. Thomas L. Fawick, Akron, the inventor of the Airflex clutch, is prominently identified with the company.

The same engineering principle that today is preventing thousands of motorcars from skidding on wet and slippery pavements through the multi-vaned tire tread, has made possible the new type of mechanical clutch.

Rubber clutches have been successfully operated for months in marine engines and oil well rigs. Licenses for the distribution of the marine type have been granted to the Falk Corp., Milwaukee.

A complete line of these clutches is being developed for industrial purposes, such as machine tools, conveyors, diesel electric generators, and similar uses, as well as the larger applications in the marine engine and oil well fields.

American Zinc Co. to Rebuild Acid Plant

CLEVELAND—H. K. Ferguson Co., Cleveland, has been awarded by the American Zinc Co. of Illinois, a contract to design and rebuild a portion of the company's sulphuric acid plant at East St. Louis, Ill. Four new Mills Packard chambers will be installed. Andrew M. Fairlie, Atlanta, Ga., is consulting engineer.

Reynolds Wire Co. to Expand Plant at Dixon, Ill.

CLEVELAND—Contracts for construction of a 60,000 sq. ft. addition to the Reynolds Wire Co. plant at Dixon, Ill., have been awarded to the Austin Co., engineers and builders.

The new three-story and basement reinforced concrete addition replaces a frame building and represents an investment of \$175,000. It will be used for manufacturing and storage space.

The Reynolds Wire Co. is one of the country's largest wire screen cloth producers and has reported a steady increase in volume of business over a period of some months.

Tata Iron & Steel Co. Buys Lewis Sheet Mills

PITTSBURGH—The Lewis Foundry & Machine division of Blaw-Knox Co. has received an order from Tata Iron & Steel Co., Jamshedpur, India, for two Lewis three-high sheet mills and accessory equipment. Part of an expansion program, these units will increase the India firm's sheet producing capacity by more than 100,000 tons annually.

Republic Steel to Build Ore Concentration Plant

CLEVELAND—Republic Steel Corp. will start construction of an iron ore concentration plant immediately at Port Henry, N. Y.

The plant will be used in connection with iron mines operated by the company in the Port Henry district. It will have a capacity of 500,000 tons a year and is being planned so that it can be expanded if necessary to a million-ton annual capacity. The new mill, which replaces an old one, will, through use of modern equipment and methods, produce high grade ore.

The plant will be completed in from four to five months, it is expected.

Baldwin-Southwark Corp. Awarded \$320,000 Order

PHILADELPHIA—Baldwin-Southwark Corp. has been awarded an order from the Lower Colorado River Authority for two 27,000-hp., I.P. Morris hydraulic turbines, including governing mechanism for installation at Marshall Ford Dam on the Colorado River in Texas. The total value of the order is about \$320,000.

Marketing Council Formed In Western New England

MARKETING and advertising men of Connecticut and western Massachusetts have organized the Industrial Advertising and Marketing Council, which will become affiliated with the National Industrial Advertisers Association. E. V. Creagh, sales promotion manager of the American Chain & Cable Co., Bridgeport, Conn.,

was elected president of the new organization; A. W. Tucker, of Henry G. Thompson & Co., New Haven, Conn., first vice-president; C. H. Winslow, of the Cuno Engineering Corp., Meriden, Conn., second vice-president, and Galen Snow, of Snow, Bates & Orme, Inc., Springfield, Mass., secretary-treasurer. The next meeting is to be held at Waterbury, Conn., on Sept. 14.



Thomas Strip
COLD ROLLED STEEL

BRIGHT FINISH
UNCOATED • ELECTRO
COATED IN NICKEL
ZINC • COPPER • BRASS
BRONZE AND TIN

REPRESENTS EXPERIENCE
IN STEEL SPECIALIZATION

By specializing on manufacturers' needs for better qualities and greater economies, Thomas Steel has become one of the largest steel finishing plants in the United States. We are able to furnish cold rolled strip steel to very definite specifications of gauge . . . width . . . length . . . edge . . . temper and physical properties. Thomas Strip is available in a wide variety of high quality finishes.

THE THOMAS STEEL COMPANY • Warren, Ohio

PERSONALS . . .

PAUL F. ZERKLE, formerly Ohio district manager of Midwest Tool Co. and the McCrosky Tool Corp., has been appointed vice-president in charge of sales of the National Tool Co., Cleveland. Mr. Zerkle was one of the charter members of the American Society of Tool Engineers, and past president of the Cleveland chapter. He is widely known in the machine and cutting tool industry, having started his apprenticeship 22 years ago in the trade of tool making and designing under Walter P. Chrysler, at the Buick Motor Co., where he served in various development and experimental capacities for five years. From 1922 to 1927 Mr. Zerkle was general field engineer for the Murcley Machine & Tool Co., Detroit.

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JED S. FOSTER, vice-president and chief engineer of the Lidgerwood Mfg. Co., Elizabeth, N. J., was honored at a testimonial dinner at the Winfield Scott Hotel, Elizabeth, N. J., on July 3, the occasion being the 50th anniversary of his active service with the company. Mr. Foster's name first became prominently associated with large engineering projects during the building of the Panama Canal in 1907 and during subsequent years he designed machinery that has been an important factor in the development of water power and irrigation systems throughout the United States and abroad. Mr. Foster was presented with a gold medallion on which was inscribed "Fifty Years of Meritorious Service—1889 to 1939—Lidgerwood Mfg. Co." Mr. Foster is continuing in active service with the company.

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J. Q. MECUM has been named assistant works auditor of Gary works of the Carnegie-Illinois Steel Corp. Mr. Mecum began his association with the corporation about a year ago in the methods and procedure department at Pittsburgh, where he remained until coming to Gary works. Prior to this he had been employed by the Chicago, Burlington & Quincy Railroad at Galesburg, Ill.; Wilson & Co., Kansas City; the American Steel Foundries, Hammond, Ind.; and the Bendix Products Corp., South Bend, Ind.

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JOHN R. COX, former director of manufacturing at Thompson Products, Inc., Cleveland, has been appointed



P. F. ZERKLE

vice-president and general manager of the Weatherhead Co., Cleveland automotive parts manufacturer. At one time he was president of the Cleveland Piston Co. and president of the Cox Tool Co. A. A. ABRAMASKA, former chief tool designer of Thompson Products, also has gone to the Weatherhead Co.



J. R. COX

JOHN E. SNOWBERGER, who has been an employee of Willys-Overland for the past 19 years today was appointed works manager at the factory by JOSEPH W. FRAZER, president of the Willys-Overland Motors, Inc. A career man in mechanical designing, Snowberger joined Willys-Overland in 1920 in charge of the tool and die design department. He served in succeeding years in the engineering department and research department and several years ago was promoted to the position of assistant master mechanic. He has been master mechanic for the past two and one half years. He served his apprenticeship in tool making and engineering at the Landis Grinding Machine Co., of Waynesburg, Pa. After learning his trade he went to work for the Pratt & Whitney Co., as an engineer in their Hartford, Conn., plant. During the war he was in the tool and equipment division of the Savage Arms Co. at Utica, N. Y. His first automobile job was with General Motors in the tool and equipment division in 1918 and he went directly from that job to Willys-Overland.

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IVAN REITLER, retired president of the Federated Metals division of the American Smelting and Refining Co., has been elected president of the Metal Reduction Corp. of New Jersey.

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COL. GEORGE W. BLACKINTON of Jackson, Mich., president of the Lake States Products, Inc., and an official of Turnmilling Corp., will go to Lowell, Mass., to become general manager of Heinz Electric Corp. a division of Houdaille-Hershey Corp.

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C. J. EDWARDS has been appointed district sales representative at Detroit for LaSalle Steel Co., Chicago, succeeding the late J. R. Ide.

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MORRIS E. LOWDER has been appointed general manager of sales of Superior Steel Corp., Pittsburgh, to take effect Aug. 1. Mr. Lowder has been in the employ of Superior since January, 1931, and prior to his new appointment was district manager in Chicago. FRED G. MYERS, who has been with Superior since November, 1933, having started in the capacity of sales clerk, has been appointed manager of carbon steel sales. WALTER G. BLUME, who has been an employee of the corporation since October, 1917, starting in the capacity as stenographer and clerk, has been appointed manager of stainless steel sales.

Firth-Sterling Subsidiary To Be Located in Detroit

FIRTH-STERLING STEEL CO., McKeesport, Pa., has announced the election of officers of American Carbide Alloys Corp., its newly acquired and wholly owned subsidiary. *L. Gerald Firth*, president of Firth-Sterling, was elected president of the new company. *G. A. Jacobs* of the company's Detroit office was made first vice-president; *W. H. Lolley*, New York, second vice-president; *Clyde N. Gillespie*, McKeesport, treasurer; *H. R. Huemme*, McKeesport, secretary; *R. H. Hallagan*, Detroit,



L. GERALD FIRTH

assistant secretary and assistant treasurer; and *George Knaepper*, Detroit, was appointed chief engineer in that area.

It also was announced that the main office and works of the new company will be located in Detroit. Mr. Firth, president, reported that all equipment and stock located at American Carbide's plant at Lewiston, Maine, is being transferred, and the future manufacturing of the new sintered titanium carbide cutting material will be carried on in Detroit, and at Firth-Sterling's plants in McKeesport.

Acme Steel Co., Chicago, reported net profit of \$259,969 for the quarter ended June 30, compared with \$62,170 in the same period of 1938. For the six months ended June 30, Acme earned \$599,641 as against \$63,139 in the first half of last year.

New Book Describes Protective Coatings

"PROTECTIVE Metallic Coatings for Metals," a book originally written in 1927 by H. S. Rawdon of the National Bureau of Standards, has been completely revised and brought up to date by R. M. Burns, assistant chemical director of the Bell Telephone Laboratories, New York, and A. E. Schuh, director of research, United States Pipe & Foundry Co. This book is published by the Reinhold Publishing Co. as a monograph of the American Chemical Society. In format it is 6x9 in., 407 pages, profusely illustrated; price \$6.50.

The original work by Rawdon was the pioneer in the field but the rapid and far-reaching advance in metal protection since that time has made it necessary to bring this work up to date. How well the authors have performed their work is indicated by the fact that they have not only broadened the book to include paints, but they have also written an almost completely new treatise.

Coatings for metals are considered entirely from the point of view of their function as protectors. Consequently the problem of corrosion and wear resistance (but mainly corrosion) are uppermost throughout the book. Chapter I is devoted to a discussion of protective coatings and the mechanism of corrosion, explaining the fundamentals, such as the electro-motive force series, polarization, etc., and giving the foundation of basic theory for the practical applications which follow. Although, as the authors state, the volume is not intended to be a manual for the production of protective coatings, it is nevertheless of great practical value in the investigation of corrosion problems and combating this evil by prevention, or by the protection of the basis metal surface.

Chapter II describes briefly the preparation of the metal surface for the application of coatings, discussing degreasing, pickling (chemical and electrolytic), sandblasting, alkaline cleaning (chemical and electrolytic), scratch-brushing, grinding, polishing and buffing. Chapter III goes over the broad classes of metallic coatings and the methods of application: hot dipping, cementation, cladding, electroplating, metal spraying, cathode sputtering and vapor coating.

The subject of zinc coating is gone into in great detail and at considerable length, three chapters being devoted to

it. Zinc may be applied by hot dipping, electroplating and cementation. An entire chapter is devoted to the subject of the protective value of zinc coatings under a variety of conditions and types of service. Other metallic coatings covered are cadmium, tin, nickel, chromium, copper, lead, aluminum, brass, cobalt, tungsten and tantalum, as well as the noble and rare metals, silver, gold, rhodium, platinum, palladium, indium and rhenium.

A chapter is devoted to the methods of testing metallic coatings. Those not directly engaged in metal coating and finishing work may be surprised at the number of tests available. They may also be disappointed by the fact that no test is really conclusive; that they are all subject to a fair degree of error, and that their correlation with life in actual service is often poor. Nevertheless, they do serve as bases of comparison.

Three chapters are devoted to the subject of paints, their composition, evaluation and methods of application. Although paints are often considered a field apart from metal finishing generally, it is wise to include them in this volume. Fundamentally paints are one of the many protective coatings applicable to metals, including not only metallic oxide and other chemical pigments, but also organic finishes, lacquers, synthetics, enamels, japs, varnishes, etc.

Miscellaneous coatings covered include electrolytic oxide coatings on aluminum, chemical dip coatings produced by acids and alkalies, vitreous enamel coatings and even the protection of metals and machinery by slushing compounds.

The book is as nearly all-inclusive as one volume can be, and unquestionably authoritative. (Only the delays inevitable to the publication of a volume of this size made it appear after the advent of a commercial process for electroplating aluminum which was therefore omitted from the book.)

General Electric Sales Up 32% This Year

SALES billed by General Electric Co. during the first six months of 1939 amounted to \$146,299,212, an increase of 12 per cent over the \$130,910,638 billed in the corresponding period of 1938, President Gerard Swope has announced. Orders received during the first six months this year amounted to \$169,071,646, compared with \$128,223,823 for the same period last year, an increase of 32 per cent.

Crucible Steel Co. Salutes Aviation in Special Booklet

IN a limited edition of 1000 copies, the Crucible Steel Co. of America has published an unusual booklet titled "A Salute to Aviation," which is being distributed to a selected list by Raoul E. Desvergne, president of the company.

The booklet, 11 x 14 in., is printed handsomely by offset process on heavy stock, the cover stock being of silver overlaid with cellophane. Spiral binding is used.

The text stresses the increasingly important part that steel plays at this time, which is called "The threshold of aviation's greatest era." A foreword says:

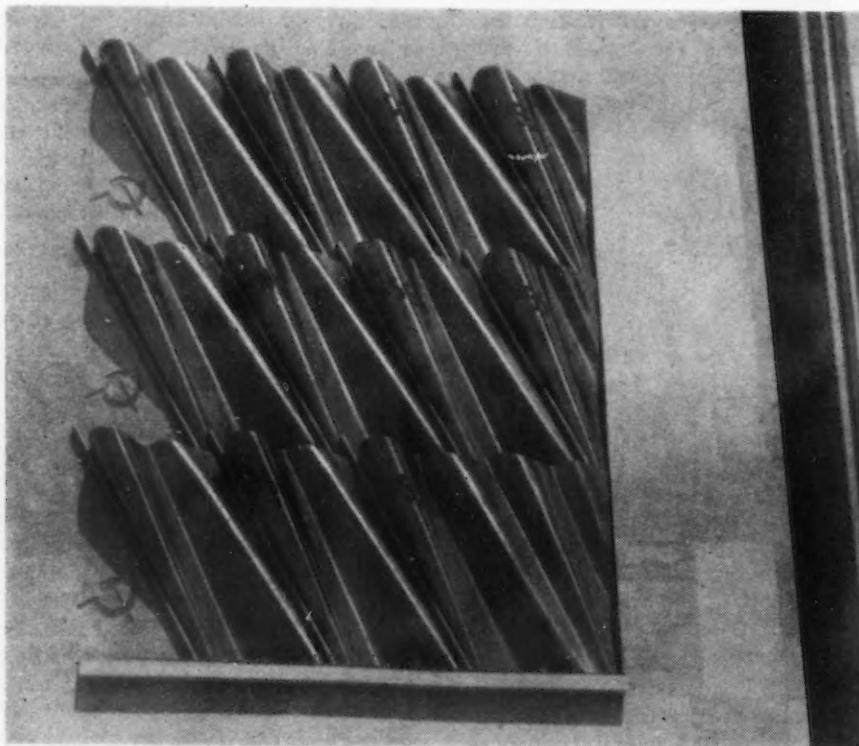
"In the development of aviation the steel industry has played an active part. Steelmakers have accorded to aviation

far more than a passive willingness to supply that which was wanted when it was wanted. Rather the steel industry has taken an active interest in aviation; has recognized its development to be of true value; has conducted widespread and thorough research into unexplored realms of metallurgy—research which, certainly at first, was far out of proportion to the comparatively small requirements. Special personnel was engaged; expensive laboratories and equipment were provided; unusual flexibility in machine and plant design and construction was arranged to anticipate the demands of aviation. Crucible Steel believes that all steel makers will agree that their faith in aviation has been amply justified. And through its increasing use of steel, the widely diversified aviation industry is in a large degree enabled to enter confidently into its new era of expansion."

American-Made Stainless Steel Flags Adorn Russian Exhibit

ONE of the five most popular exhibits at the New York World's Fair is the elaborate building of Soviet Russia. And a focal point for many eyes are these metal flags, symbolic of the several Soviet States. They are made from Enduro 18-8 stainless steel, product of Republic Steel Corp., Cleveland. They are

designed to simulate the rippling effect of cloth flags in the wind and represent the craftsmanship of Loeben Ornamental Metal Works, Philadelphia. Approximately 1800 lb. of sheets, 48 in. wide, were used. In addition, the flag staffs were formed from 16 gage stainless steel tubing, 2½ in. in diameter.



1938 Strikes Caused Loss of 9,148,273 Man-Days

CHICAGO — Strikes in Illinois during 1938 caused a loss of 399,630 man-days, according to a statement by the Illinois Manufacturers' Association, based on figures obtained from the U. S. Department of Labor.

This was 4.4 per cent of the total number of man-days lost during the year in all the states, amounting to 9,148,273.

Reports from some of the leading industrial states were as follows:

	Man-Days Idle	Per Cent of Total
New York	1,789,181	19.8
Pennsylvania	1,410,615	15.4
California	966,712	10.6
Illinois	399,630	4.4
Michigan	349,553	3.8
Ohio	322,222	3.5
Wisconsin	302,867	3.3
Indiana	239,783	2.6

More than one-quarter or 764 of the strikes in the United States were in New York State. There were 352 in Pennsylvania, 198 in New Jersey, 168 in California, 138 in Illinois, 116 in Ohio, 95 in Michigan, 88 in Wisconsin, and 67 in Indiana. Wyoming was the only state for which no strikes were recorded in 1938.

There were more strikes, 639, in New York City in 1938 than in all the other cities together. Philadelphia with 122 had the next highest number of strikes and was second to New York City in man-days idle, although Detroit had twice as many workers involved as Philadelphia.

In half of the strikes, the major issues were union recognition and the closed shop. These strikes included nearly one-third of the workers involved and caused about 44 per cent of the total man-days idle resulting from all strikes throughout the country during the year.

Twenty-eight per cent of the strikes were over wage-and-hour issues. Twenty-two per cent resulted from factional or jurisdictional questions. Less than 1 per cent of the total were sympathetic strikes.

ERRATUM

THE electric welding timer illustrated and described on page 62 of the July 6 issue was erroneously referred to as a product of the Electronic Corp., of Detroit. Actually, this apparatus, which employs standard relays and electronic tubes, is made by the Weldtronic Corp., of Detroit.

SWOC Plans Drive Against Bethlehem Steel Co.

CHICAGO — The Bethlehem Steel Co. will be the chief objective of a new drive by the Steel Workers Organizing Committee to unionize "Little Steel," according to Philip Murray, chairman of the CIO unit, who is meeting here this week with 125 regional directors of the SWOC to discuss plans for the new campaign.

Legal avenues to success will be sought, it was indicated, rather than recourse to strikes and violence. The union seeks to hasten the decision of the Labor Board on the SWOC charges that Bethlehem maintains company-dominated unions at its various plants. It will, however, proceed with aggressive organization campaigns at each of Bethlehem's properties, Mr. Murray said.

Other matters pertaining to the policies to be adopted during the drive were discussed at the meeting.

La Follette Labor Bill Reported Favorably

WASHINGTON — The La Follette labor practices bill, representing what the Senate Civil Liberties Committee thinks should be done on the basis of its two-year inquiry into industrial espionage and civil liberty violations, was reported favorably last week by the Senate Education and Labor Committee.

Introduced by Senator La Follette, chairman of the sub-committee which bears his name, the measure would prohibit the use of labor spies, strike breakers, strike breaking agencies, privately paid armed guards off the employers' premises, and the possession and use of industrial munitions.

Gray Iron Engineering Properties Described

BAASIC information on the engineering properties of gray cast iron, heretofore scattered through countless reports, transactions, books, etc., in this country and abroad, has been collected, correlated and put under one cover by the Gray Iron Founders' Society, 1010 Public Square Building, Cleveland.

The material, collected by Battelle Memorial Institute of Columbus under contract with the founders' group, has been published in the form of a book

entitled "Engineering Properties of Gray Cast Iron." The book consists of four sections. The first contains a listing of mechanical properties and a discussion of the effects of section size. The second gives additional information on properties not commonly determined, such as machineability and corrosion resistance. In section three is a bibliography with comment on the inter-relation of various properties, while in section four are literature references grouped by topics.

CIO Union Wins Bargaining At Vanadium Corp. Plant

WASHINGTON — The National Labor Relations Board has certified the CIO's United Vanadium Workers as the sole collective bargaining agency for employees of the Vanadium Corp. of America, Bridgeville, Pa. The board, which checked union membership cards with the company payroll list, said that the firm did not question the genuineness of the signatures nor the majority claim of the union but merely asked for a certification by the NLRB.

Tin Can Sizes May Be Simplified Voluntarily

WASHINGTON — Can manufacturers, canners, distributors and consumers are being circularized by the Bureau of Standards on simplified practice recommendations covering a smaller number of can sizes which, if accepted and voluntarily adhered to, are expected to obviate the pressure for any national legislation on the subject.

The proposed standards, which include a list of 44 sizes recommended for adoption, conform to the broad intent of a House bill on which hearings were held by the Coinage, Weights and Measures Committee last year. After approval, the standards are expected to become effective for the 1940 canning season, although present plans call for two effective dates—one for the manufacture of new cans; the other to provide for the clearance of the eliminated containers.

A bill similar to the one introduced last session is now pending in

Congress. Identified as H. R. 4402, the measure is entitled, "a bill to fix standards of dimension and capacity for metal containers for canned fruits, vegetables, and canned milk, in order to prevent fraud and deception in containers used in the sale and distribution of these products, and for other purposes."

Polish Steel Problem Is Settled by Cartel

LONDON, July 25. (By Cable) —The Polish steel problem which arose because of the purchase by Polish interests of the Czechoslovakian Trinec works has been settled by the Cartel. Polish mills will roll Trinec semi-finished and finished steel for markets not under Cartel control.

Jones & Laughlin Has Loss Of \$471,287 in Quarter

JONES & LAUGHLIN STEEL CORP. reports for the quarter ended June 30, 1939, a net loss of \$471,287 after depreciation, interest, taxes, etc. This compares with a net loss of \$376,525 in the first quarter of 1939 and with a loss of \$1,680,359 in the second quarter of 1938. Loss for the first half of 1939 was \$847,812 against a deficit of \$2,827,865 in the corresponding period of last year.

CANADA

... *Toronto Postoffice will take 1000 tons of steel*

TORONTO, July 25—Canadian iron and steel markets showed little activity during the past week. Demand was confined to small lots for immediate delivery. Prices are firm and unchanged.

Announcement was made at Ottawa that work will be started immediately on the erection of addition to the Postoffice at Toronto, for which upward of 1000 tons of reinforcing steel will be required.

Automotive buying has slowed down and orders from this source are slow. Building trades, however, are responsible for fair movement of steel and builders' hardware.

Pig iron sales are featureless. Demand is for small tonnage lots for spot delivery and no forward delivery contracts or large tonnage awards are reported.

Navy May Spend \$6,000,000 to Equip Armor Plate Plants

WASHINGTON—Because of advice from the Budget Bureau that production facilities for manufacturing armor plate are not adequate to meet the delivery schedule for battleships under construction, President Roosevelt has asked Congress to authorize the Navy to use \$6,000,000 of its shipbuilding funds for supplying manufacturers with the extra equipment which can be leased, sold or otherwise disposed of when no longer required for use under naval contracts.

Before making the request, Mr. Roosevelt was informed by Director of the Budget Harold D. Smith that "manufacturers of armor are unwilling to bear the cost of installing the facilities required to supply the present peak load demand, as they consider such facilities are not required for their normal operation and would be unnecessary when the current program for building battleships has been reduced to normal replacements."

Reasoning that irrespective of whether the Government buys the additional facilities it will pay indirectly for equipment, Mr. Smith told the President that it would be preferable to have the Navy purchase the facilities because of possible economies in buying, simplification of procedure, recovery of salvage value when no longer needed, and the elimination of the cost of added facilities from armor plate contracts. He said this would reduce the amount of such contracts, thereby preventing "a possible profit thereon being paid to the contractor."

Bethlehem Sheet Mill Runs 1845 Tons in 8 Hr.

BUFFALO—A new record for sheet steel production in a single 8 hr. shift was made this week by the hot mill of the Bethlehem Steel Co.'s Lackawanna strip plant. The mill turned out 1845 tons to surpass the record set two weeks ago by Bethlehem's strip mill at Sparrows Point, Md., of 1661 tons.

Sheet & Tube Profits \$329,086 for Quarter

SECOND quarter net profit of \$329,086 before preferred dividends is reported by Youngstown Sheet & Tube Co. This compares

with net profit of \$217,106 in the first quarter before preferred dividends and \$118,033 in the second quarter of 1938. The company's profit for the first half of 1939 amounts to \$546,193.

Directors have voted to pay the regular quarterly dividend of \$1.37 1/2 per preferred share upon Oct. 1, to stock of record Sept. 9.

... PIPE LINES ...

Louisiana-Nevada Transit Co., Cotton Valley, Webster Parish, La., will begin work soon on new welded steel pipe line from local gas field area to Okay, Howard County, Ark., about 75 miles, with extension from latter point to Hope, Ark., about 12 miles, for natural gas transmission for distribution at both places noted. Company has contracted to furnish supply to Ideal Cement Co., Okay, and to Hope Brick Works, Hope, also for municipal power plant operation at latter place, in addition to other consumers. Project will include booster stations, control plants and other operating facilities. Cost over \$450,000.

General Purchasing Officer, Panama Canal, Washington, asks bids until Aug. 2 for 92,880 ft. of galvanized welded steel pipe (Schedule 3519).

L. J. Houze Convex Glass Co., Point Marion, Pa., plans two 4-in. steel pipe lines under bed of and banks of Cheat River, also across channel, vicinity of Cheat Haven, Fayette County, Pa., for natural gas transmission for plant service.

Belmont Quadrangle Drilling Corp., Bradford, Pa., J. B. Cleaves, secretary, plans steel pipe lines in conjunction with development of new gas wells in Leon field district, Cattaraugus County, N. Y., including pipe lines for connection with existing trunk lines for natural gas transmission.

Washington Gas Light Co., 411 Tenth Street, N.W., Washington, plans pipe line extensions in connection with proposed acquisition of gas properties of Washington & Suburban Co., Alexandria, Va., and Hyattsville, Md.

Bureau of Reclamation, Denver, asks bids until Aug. 1 for steel pipe, fittings, valves and accessory equipment for emergency-gate air inlets and drum-gate control at Grand Coulee Dam, Grand Coulee, Columbia Basin project, Wash. (Specifications 866).

United States Engineer Office, Federal Building, Galveston, Tex., asks bids until July 31 for 287 ft. of 23-in., 205 ft. of 22-in. and 205 ft. of 21-in., all outside diameter, hammer-lap-welded steel pipe (Circular 14).

East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, Cal., has low bid from Steel Tank & Pipe Co., Berkeley, Cal., at \$20,104 for 4900 ft. of 20 and 36-in. electric-welded, cement-lined steel pipe for water distribution system.

New Company in Detroit To Compress Sheet Scrap

DETROIT—A new company, the Michigan Hydraulic Steel Co., has been organized at Dearborn, Mich., with quarters at the corner of Wyoming and Southern Aves. on the outskirts of Detroit. The general manager is Frank G. Tuschman, formerly with the Kraske Iron & Metal Co. and more recently with I. Gerson & Sons, Inc., Toledo. The company will make a specialty of compressing auto sheet scrap.

... OBITUARY ...

ALBERT EDWARD WRIGHT, purchasing agent for the Bowen Products Corp., Detroit, was buried July 18. He was 48 years old.

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HUGH LEE McCOMB, Ohio manager for the Essex Wire Corp., died of a heart attack July 19 in his summer home at Grand Lake Mich. He was born in Akron and his home and headquarters were in Columbus, but he spent much of his time in Detroit and burial services were held in Detroit. Mr. McComb was a graduate of the University of Cincinnati.

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HAROLD W. JEFFERY, for many years a Kenosha, Wis., business and industrial leader, and an official of the former Thomas B. Jeffery Co., died July 14 in New York City where he had been residing for several years. His death followed an illness of several years, and more recently following an illness occurred while returning from a trip to Greece.

Weirton Steel Co. Orders New High-Speed Drive

PITTSBURGH — Electric drive equipment designed to operate a four-stand tandem cold reduction strip mill at rolling speeds higher than any now in use for this type of mill has been ordered from the Westinghouse Electric & Mfg. Co. for a relocated mill of the Weirton Steel Co. at Weirton, W. Va.

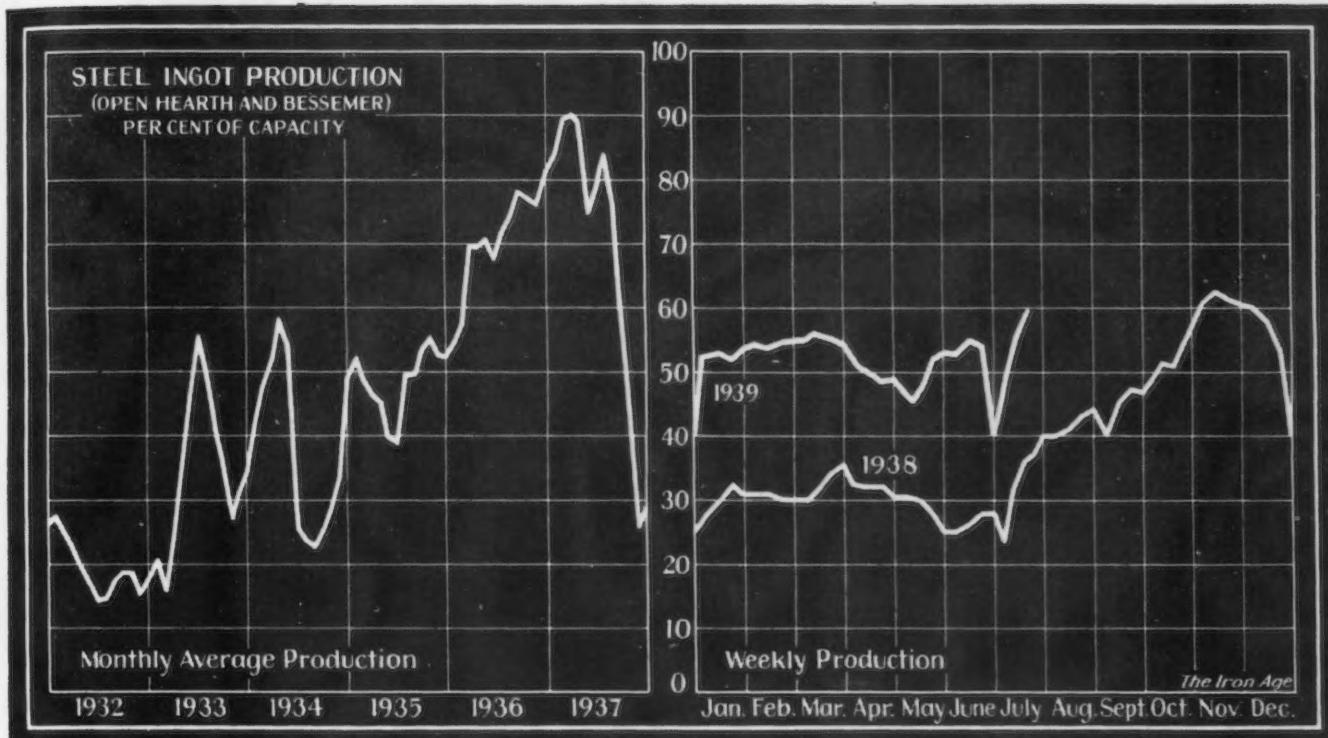
The order includes four mill motors with a combined power output approaching 5000 hp., a 300-hp. reel motor, a 5000-kw main motor-generator set and a 650-kw auxiliary motor-generator set.

About half of the main motors will be built to run at the higher desired operating speed of the rolls to which they will be directly connected, thus eliminating intervening gears.

Washing Machine Shipments Gain Sharply Over Last Year

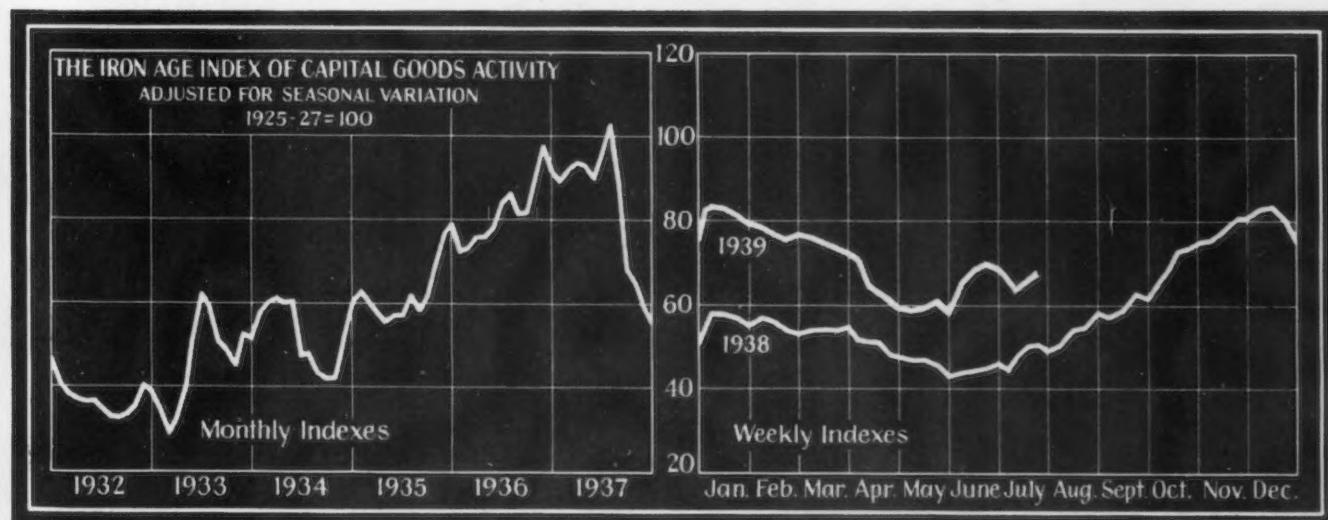
CHICAGO—June shipments of household washers abruptly reversed seasonal trends to total 120,076 units, an increase of 53.26 per cent over 78,354 in June, 1938, according to figures reported by Joseph R. Bohnen, executive secretary-treasurer of the American Washer and Ironer Manufacturers' association. June was the eighth consecutive month to show an increase over the same month in the preceding year.

Ingot Production Rises to New High of 60%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	S. Ohio River	Southern	Western	St. Louis	Eastern	Aggregate	
CURRENT WEEK..	51.0	56.0	52.0	41.0	70.0	51.5	77.0	62.0	82.0	40.0	57.0	49.5	45.0	60.0
PREVIOUS WEEK..	49.0	54.0	54.0	41.0	52.0	46.5	77.0	62.0	75.0	34.0	57.0	49.5	45.0	56.5

Small Gain Recorded by Capital Goods Index



AFURTHER firming of THE IRON AGE index of capital goods activity was in evidence last week, but despite the period's improvement, the second consecutive weekly increase from the July 4th low, the index has not yet completely recovered the ground lost in the holiday week. For the week ended July 22 the index was 66.2, as compared with 64.1 in the preceding week and 61.9 in the holiday week. In the pre-holiday week the index stood at 68.5. The steel, lumber and Pittsburgh series were all sharply higher in the past week, but their strengthening effect was diluted somewhat by a substantial loss in the automobile factor. A continued decline in

this latter factor may be expected over the next six to eight weeks as the industry goes through its annual model changeover period.

	Week Ended July 22	Week Ended July 15	Comparable Week
Steel ingot production ¹	81.8	73.9	50.3 141.4
Automobile production ²	47.9	59.5	35.4 127.2
Construction contracts ³	67.7	68.4	60.5 121.4
Forest products carloadings ⁴	59.3	49.2	53.8 125.0
Production and shipments, Pittsburgh District ⁵	74.3	69.3	48.9 131.0
Combined index	66.2	64.1	49.8 129.2

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

SUMMARY OF THE WEEK

... *Ingot production rises to 60 per cent; up sharply at Cleveland.*

... *Current rate is highest since November, 1938; scrap stronger.*

... *New business in steel slightly ahead of the June volume.*

AMIDSUMMER steel production rate of 60 per cent attained this week bears out a prediction made by THE IRON AGE in mid-June and again last week, though it has come a little sooner than expected, thereby giving promise of a still higher rate when automotive buying for 1940 models has assumed larger proportions.

The current rate is the highest since November, 1938, being well over this year's previous peak of 56 per cent in March. The sharpest rise was in the Cleveland-Lorain district, where operations average 70 per cent, 18 points over last week. Elsewhere gains were more moderate, amounting to two points at Pittsburgh and Chicago, seven points in the South, where the rate of 82 per cent is the country's highest, and five points at Buffalo.

Ingot production continues slightly ahead of orders and shipments in preparation for sudden demands from the automobile industry. Orders this month are running moderately ahead of those booked in June, though the past week's aggregate business was not quite as good as that of the week before. Much of the current production is based on backlogs that have been accumulated in structural steel, reinforcing bars, piling and other products used in building construction, together with armament and shipbuilding requirements. However, miscellaneous business, including various lines of household equipment, is making a good showing. Aside from construction steel tonnages, orders are mostly for moderately small lots, on which quick deliveries are usually demanded, indicating no surplus of consumer stocks.

Notwithstanding the delay caused the General Motors Corp. in preparation of 1940 models by the continuance of the tool and die makers' strike, releases of steel for automotive work, particularly from parts makers, are a little better, though the bulk of the tonnage for initial runs on new models is still to come. Previews of Packard and Studebaker cars, scheduled for early August, confirm expectations of an early beginning of the 1940 model season.

REPORTS of fresh price concessions on sheets and strip in the Detroit area are declared by the steel trade to be incorrect and evidently arise from a misunderstanding of the blanket commitments that were made at the time of the extreme price decline last May when automobile manufacturers and general consumers were covered through the third quarter and possibly beyond that on their known requirements. After the low-priced tonnage now on the books has been shipped, which will not be until late in the year, it is not unlikely that some upward readjustments in quotations on flat rolled products may be made, although it is too early to predict the nature of such readjustments. However, mills seem to be determined to prevent a repetition of the May fiasco.

Meanwhile, efforts to strengthen the price situation on other products continue. New quantity extras on small lots of hot rolled carbon bars have been announced, effective immediately. These establish extras ranging from 5c. to \$1.50 per 100 lb. on various lots under 20 tons of one size, grade or analysis. New size extras on rounds and squares up to 11/32 in. and a revision of cutting and chemical requirement extras have also been adopted. A further change is the adoption of the merchant bar base on plain rounds even if sold for reinforcing purposes. Prices on merchant wire products are steadier prior to the effective date of new extras, which is Aug. 1, and plates, which have been a weak item, are firmer, sales having been made at the published price of 2.10c. a lb.

LETINGS of fabricated structural steel are running at a fairly steady volume, totaling upward of 19,000 tons, about the same as in the previous week, while new projects out for bids amount to nearly 17,000 tons. Awards of reinforcing bars were about 11,500 tons.

Railroad buying still lags, but a few secondary orders for rails have been placed and the American Refrigerator Transit Co. will buy steel for 100 refrigerator cars to be built in its own shops. There is still hope that a larger volume of railroad buying will develop if Congress passes a bill that is satisfactory to the carriers.

THE IRON AGE steel scrap composite price has moved upward for the third consecutive week, having gained 9c. to \$15.13 because of a stronger market at Chicago. Much of the current strength, however, is based on broker-dealer transactions, which have put some prices at Detroit up as much as \$1 a ton. Mills are not yet buying heavily. Cast scrap grades are coming closer to the price of pig iron.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

	July 25, 1939	July 18, 1939	June 27, 1939	July 26, 1938
Per Gross Ton:				
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	40.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	43.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

	2.15	2.15	2.15	2.25
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham				
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.10
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.00	2.00	2.00	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.00	2.00	2.00	2.15
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.05	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

July 25, 1939	2.236c. a Lb.
One week ago	2.236
One month ago	2.236
One year ago	2.300

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

High

1939.....	2.286c., Jan. 3; 2.236c., May 16
1938.....	2.512c., May 17; 2.211c., Oct. 18
1937.....	2.512c., Mar. 9; 2.249c., Jan. 4
1936.....	2.249c., Dec. 28; 2.016c., Mar. 10
1935.....	2.062c., Oct. 1; 2.056c., Jan. 8
1934.....	2.118c., Apr. 24; 1.945c., Jan. 2
1933.....	1.953c., Oct. 3; 1.792c., May 2
1932.....	1.915c., Sept. 6; 1.870c., Mar. 15
1931.....	1.981c., Jan. 13; 1.883c., Dec. 29
1930.....	2.192c., Jan. 7; 1.962c., Dec. 9
1929.....	2.223c., Apr. 2; 2.192c., Oct. 29
1928.....	2.192c., Dec. 11; 2.142c., July 10

Pig Iron

\$20.61 a Gross Ton
20.61
20.61
19.61

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

\$15.13 a Gross Ton
15.04
14.71
14.08

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High	Low
\$23.25, June 21; \$19.61, July 8	
23.25, Mar. 9; 20.25, Feb. 16	
19.73, Nov. 24; 18.73, Aug. 11	
18.84, Nov. 5; 17.83, May 14	
17.90, May 1; 16.90, Jan. 27	
16.90, Dec. 5; 13.56, Jan. 3	
14.81, Jan. 5; 13.56, Dec. 6	
15.90, Jan. 6; 14.79, Dec. 15	
18.21, Jan. 7; 15.90, Dec. 16	
18.71, May 14; 18.21, Dec. 17	
18.59, Nov. 27; 17.04, July 24	

High	Low
\$15.29, Mar. 28; \$14.08, May 16	
15.00, Nov. 22; 11.00, June 7	
21.92, Mar. 30; 12.92, Nov. 10	
17.75, Dec. 21; 12.67, June 9	
13.42, Dec. 10; 10.33, Apr. 29	
13.00, Mar. 13; 9.50, Sept. 25	
12.25, Aug. 8; 6.75, Jan. 3	
8.50, Jan. 12; 6.43, July 5	
11.33, Jan. 6; 8.50, Dec. 29	
15.00, Feb. 18; 11.25, Dec. 9	
17.58, Jan. 22; 14.08, Dec. 3	
16.50, Dec. 31; 13.08, July 9	

THIS WEEK'S MARKET NEWS

PRICES

... Trend is toward firmer quotations . . . Quantity extras announced on small lots of bars

DEVELOPMENTS in the price situation within the past week tend to confirm recent statements that quotations are on a firmer basis, although new buying of some major products has not been heavy enough to provide a major test. However, sales of plates have been made at 2.10c., mill, the full published price, and prices of merchant wire products are steadier in advance of the effective date of the new card of extras—Aug. 1.

Newspaper reports of new concessions on flat rolled products are incorrect and are evidently based on a misunderstanding of the blanket commitments which were made last May. Nearly all consumers, including the automobile companies, availed themselves at that time of the opportunity to cover their requirements for some time ahead. It is stated by some of the mills that neither automobile companies nor general consumers are being permitted to increase their commitments at the low prices or to obtain further reductions in price. After the low-priced tonnage now on the books has been shipped it is not unlikely that some upward sheet and strip price readjustments may be made, although it is too early to predict the nature of such readjustments at this time. Mills seem to be determined to prevent a repetition of the May fiasco.

New quantity extras effective immediately on hot rolled carbon steel bars are as follows:

20 tons and over—base.
Under 20 tons to 10 tons inclusive—5c. per 100 lb.
Under 10 tons to 5 tons inclusive—10c. per 100 lb.
Under 5 tons to 3 tons inclusive—15c. per 100 lb.
Under 3 tons to 2 tons inclusive—20c. per 100 lb.
Under 2 tons to 1 ton inclusive—35c. per 100 lb.
Under 1 ton to $\frac{1}{2}$ ton inclusive—\$1.00 per 100 lb.
Under 1000 lb.—\$1.50.

These extras are determined by the total weight of a size of one grade or analysis, released for shipment to one destination at one time.

New size extras on rounds and squares up to 11/32 in. are as follows:

$\frac{1}{4}$ in. \$1.00.

9/32 in. 85c.

5/16 in. 70c.

Cutting extras have been revised, with over 120-in. lengths being 10c., with 60 to 120-in. inclusive being base, while over 48 to 60 in. is 10c.

A revision in the chemical requirement extra finds 0.09 per cent maximum carbon being base on both open-hearth and Bessemer grades, instead of the former 0.11 per cent to 0.09 per cent, inclusive.

NEW BUSINESS

... Orders this month slightly ahead of June

STEEL orders taken by PITTSBURGH district producers so far in July are ranging from 5 to 10 per cent heavier than in June for the various mills, and the total business placed so far this year is approximately 75 per cent heavier than bookings in the similar period last year. Bookings for the past week were down slightly, however, from the previous week, for some companies. Construction material is momentarily in greatest demand while semi-finished steel has tapered.

Vacation shutdowns in steel consuming plants where all workers are given vacations at one time and labor difficulties in automotive tool and die plants are factors in the dip in orders.

New steel business slackened slightly at CLEVELAND and YOUNGSTOWN during the past week, but July to date continues ahead of June by a small margin. Producers report demand from the Southern states very good, and rural demand in the North very promising. Structural steel and tin plate continue in the spotlight. Government construction and armament are two factors supplying major impetus. However, fair releases for lamp stock, bumper stock and tappet rods at CLEVELAND indicate some parts makers are going ahead despite automotive labor trouble.

Inventories by steel consumers remain low. This is shown by the pressure for quick shipments.

For the third week in July, volume of shipments and bookings in the CHICAGO area was about on a par with the previous two seven-day periods. In some cases, a slight in-

crease in bookings was reported, and sentiment for August is decidedly on the optimistic side, without being enthusiastic. Automobile demand continues a minor factor in current support of operations, which means that the so-called miscellaneous industries are still the backbone of the situation in the CHICAGO district. Important releases from the motor car field are not expected until General Motors' labor trouble is cleared up.

CHICAGO's construction industry is using considerable steel at the moment, and this condition probably will extend into the fall.

Railroad buying is very quiet, but it is understood that a good chance exists for the purchase of more rails and cars in the fall.

STEEL OPERATIONS

... Ingot production rises to 60% ... Biggest gain at Cleveland

INGOT production for the entire industry has risen sharply this week to 60 per cent, with the largest gain in the CLEVELAND-LORAIN district to 70 per cent from 52 per cent last week and the highest rate in that district since last November.

A mid-summer rate of 60 per cent, which was predicted by THE IRON AGE in its issue of June 15 and again last week, has come to pass a little sooner than was expected and thereby gives promise that an even higher rate may be attained when automotive buying has assumed larger proportions.

At PITTSBURGH and at CHICAGO there were gains of two points. The BUFFALO rate is above 51 per cent. Only at YOUNGSTOWN has there been a loss, the rate there being 52 per cent against 54 per cent last week.

PIG IRON

... Improvement in business reflected only slightly in this market

PIG iron is not noticeably sharing in the improvement in general business which has pushed steel operations above 60 per cent. However, there is a feeling in the trade that pig iron will eventually benefit if the general improvement carries through the remainder of the year.

To some extent the melt of pig iron

may gain through the higher prices now being asked for cast scrap. There will also be a gain in the resumption of melting by foundries which cater to the automotive industry and in demand from the farm machinery industry for fall production. Foundries catering to the machine tool plants are doing fairly well, and there is some filtering down of work from Government orders.

However, new buying of pig iron is in small volume in virtually all centers. Most of the shipments are against old commitments. By the end of this quarter many of these contracts probably will have been completed, and, if this is the case, the volume of new buying may improve by the next quarter. The lack of price incentive and the large stocks of iron carried in the yards at some furnaces are not encouraging factors for forward buying.

Market Sidelights

In order to increase the Agriculture Department's ever-normal granary storage facilities, Secretary Wallace has invited bids for 30,000 galvanized steel grain bins of from 1000 to 2000 bu. capacity for storage of surplus corn in the Midwestern corn belt. Bids are due in on July 31. Although present plans call for bins to store 50,000,000 bu. of corn, facilities for the storage of 100,000,000 bu. may eventually be purchased to store corn that the Government expects to take over from farmers as payment for loans made on the grain. Based on Agriculture Department estimates that the facilities will cost about 12c. per bu. capacity, from \$900,000 to \$1,800,000 would be spent on the initial outlay. The invitation for bids represents the first time the department has attempted to purchase its own storage facilities. Heretofore, the grain has been stored in private warehouses and elevators.

* * *

Gains in manufacture of electric stoves and gas engines have been reported at Toledo, Ohio, recently. The Standard Electric Mfg. Co. has gone on a two-shift basis due to heavy orders for stoves and the Rathbun-Jones Engineering Co. has been working at capacity on large gas engines.

* * *

The Navy Department's Bureau of Supplies and Accounts will open bids on Aug. 15 for a total of 1000 tons of black sheets for the two 45,000-ton battleships under construction in the New York and Philadelphia Navy yards.

STRUCTURAL STEEL

... Awards include a number of projects of fair size

FABRICATED structural steel awards in the week included a number of fair-sized projects, such as 2000 tons for an addition to Tulane University, New Orleans, which went to the Virginia Bridge Co.; 2210 tons for a bridge in Brooklyn, awarded to the Bethlehem Steel Co.; 1410 tons for five buildings for the Aluminum Co. of America at Alcoa, Tenn., taken by the Ingalls Iron Works Co.; 1365 tons for an airways terminal at 42nd Street and Park Avenue, NEW YORK, awarded to the Lehigh Structural Steel Co., and 1000 tons for a shop for the Chicago Bridge & Iron Co., CHICAGO, awarded to the American Bridge Co.

The largest new job is 4200 tons

for a vocational school in Chicago. Two bridges to be built by the Bureau of Reclamation at Delta, Cal., will require 2800 tons, while grade separation work for the Long Island Railroad will take 1600 and similar work at Blanc, Mich., calls for 1100 tons.

Included in the program for the biennium starting July 1, 1939, announced by the California Division of Highways is a total of \$6,914,400 for bridge projects. This is in addition to over \$20,000,000 for road projects. An estimate of the steel material required is not yet available.

Latest release from the U. S. Bureau of Reclamation itemizes 5000 tons of steel gates and valves, tubing, pipes, machinery and miscellaneous metal work to be placed by the contractor in connection with the construction of the Friant Dam of the Central Valley project in California, bids for which will be opened in Sacramento Aug. 23. This is in addition to 1650 tons of reinforcing steel to be placed. All this material will be purchased on separate bids direct by the bureau, after the general contract has been let.

MERCHANT BARS

... Quantity extras may be established on small lots

SPECIFICATIONS for hot rolled bars at PITTSBURGH the past week were somewhat lighter, although the decline for some mills was negligible and there has been no drop in production.

Of chief interest is a move to establish quantity extras on orders of hot rolled bars for 25 tons or less, a tentative step designed to meet some of the costs which the producers long have absorbed on small orders. For details, refer to data under "Prices."

At CLEVELAND incoming orders slackened slightly during the past week and the cumulative business total for the month up to July 24 assumed more of an even keel with the corresponding part of June. The movement of merchant bars is well spread among all types of consumers. Plain round reinforcing bars are being placed on the merchant bar base.

Bar tonnage recently booked in the CHICAGO district has been unimpressive, though important buying should be seen when the 1940 motor car models get underway and the fall demand for farm implements and tractors begins. Current interest includes a smat-

tering of business from the above two sources, and specifications from cold finishers, jobbers and forgers.

The present price of 2.15c. is firm.

The weekly volume of merchant bar purchases in PHILADELPHIA is moving sidewise, showing no noticeable week-to-week change. Total bookings thus far this month are up to the June level, with drawers, machine tool builders and warehouses providing most of the activity.

IRON ORE

... Consumption of Lake Superior ore higher in June

THE total of Lake Superior iron ores consumed by furnaces during June rose to 2,829,667 gross tons against 2,245,513 tons in May and 1,471,660 tons in June a year ago, according to the report of the Lake Superior Iron Ore Association. Ore consumed to July 1 this year amounted to 16,970,886 gross tons compared with 10,666,287 tons for the same period of 1938.

Reserves at furnaces increased from 18,835,151 tons to 21,609,841 tons and on Lake Erie docks increased from 4,236,063 tons to 4,251,396 tons. The 25,861,237 tons total on hand compared with 34,329,223 tons a year ago. There were 90 furnaces depending chiefly on Lake Superior ore in blast June 30 as compared with 82 on May 31 and 54 on June 30 a year ago.

A cargo was being loaded at Buffalo early this week for shipment to Republic Steel Corp. at Cleveland from the mines in northern New York State. Vessel movement of this ore is infrequent but rail shipments have been steady.

WIRE PRODUCTS

... Sales of merchant products behind June period

UP to the start of this week, merchant wire products sales at CLEVELAND were running behind those of the comparable June period. A certain amount of buying is being received as a hedge against the higher nail extras effective Aug. 1, but jobbers are cautious about getting their stocks too lopsided. By ordering this week, substantial savings on certain sizes can be achieved. On the other hand, extras on the most popular size, the 8 penny common nail, are not affected at all.

The only other development of interest in the market this week at

CLEVELAND is a noticeable upturn in rod releases from bolt and nut manufacturers whose orders are running ahead of June.

CHICAGO wire sellers are looking forward to August and the fall with considerable optimism. Next month releases are expected from local plants supplying the automobile industry, and soon thereafter autumn demand from the farm regions is usually experienced for merchant wire products.

Nail buying is very quiet in PHILADELPHIA as efforts to strengthen prices take hold. Quotations are now on a better level, but most consumers covered heavily during recent weakness. This heavily bought position is also acting to prevent anticipated protective covering previous to Aug. 1, the effective date of the new scale of extras.

PLATES

... Prices are firmer, but concessions have not disappeared

STRUCTURAL fabricators are providing the main demand for plates in the CHICAGO market with the exception, of course, of the large tonnages of liner plates required in the construction of the subway. The Milwaukee Road this week began work on a program to include over 1000 cars, the steel having been purchased over the past month or six weeks.

The outstanding project in Ohio is the 2800 tons of 72-in. pressure main for the Toledo municipal intake line, which was bid July 19, with Biggs Boiler Works, Akron, being low.

In the absence of important releases from the shipyards and the complete lack of railroad activity, buying by warehouses, fabricators and miscellaneous consumers continues to support the Eastern market. Bookings so far this month compare favorably with the June volume, due mainly to large shipyard releases earlier in the month and the purchase of about 2000 tons by railroads. Prices on new business are somewhat firmer, but concessions have not disappeared. Substantial tonnages are yet to be shipped on contracts carrying prices below 2.10c.

The American Bridge Co. is low bidder on 11 drum gates for the Grand Coulee Dam, which will take 6000 to 7000 tons of plates.

American Refrigerator Transit Co. has asked for bids on the materials required for 100 refrigerator cars which it plans to build in its St. Louis shops.

SHEETS AND STRIP

... Automotive buyers busier but tonnage has not increased appreciably

BOOKINGS of sheet and strip have tapered somewhat at PITTSBURGH following the placing of business backed up by the holidays. Mass vacations in plants of sheet consumers have been a factor lately in reducing flat rolled specifications, some consumers apparently desiring to get vacation periods out of the way in preparation for a period of possible better business in the late summer and fall. The automotive strikes continue to be a factor in holding up shipments of flat rolled material for that industry.

CHICAGO sellers have not noticed an appreciable increase in sheet releases in the last week either from the automobile industry or miscellaneous sources. Business from the latter classification, however, has been fairly good all during July, the pickup, when it comes, being expected to emanate largely from the motor car makers, probably about Aug. 1 and to continue throughout that month and into fall. In the past week sheets have been ordered by such widely diversified buyers as metal lath manufacturers, culvert makers, stove and refrigerator plants, and a host of others.

In addition to fair releases against blanket tonnages, scattered new orders for sheets and strip are being received at CLEVELAND and YOUNGSTOWN. For the most part, these are individually small orders by miscellaneous industries, but their frequency has been somewhat surprising. Refrigerator sales of Ohio manufacturers are good, assisted by awards for Government housing projects.

With automotive users becoming more active in the market, new sheet and strip business in the SOUTHERN OHIO district was up slightly during the past week. The Packard Motor Car Co. and the Ford Motor Co. are reported to be actively in the market for substantial amounts of sheets and mill interests generally are greeting this as the harbinger of a general improvement from the automotive industry.

Incoming business in PHILADELPHIA is very light. Sellers there are devoting most of their efforts to facilitating shipment of low-priced material, but are not meeting with much success. One large seller has set Sept. 1 as the deadline for rolling schedules on the low-priced bookings, but is dubious of being able to enforce it.

RAILROAD BUYING

... Some secondary purchasing of rails . . . Rail mill may resume

SEVERAL railroads in the past week have made secondary purchases of rails. Among these were the New Haven, which ordered approximately 7000 tons, and the Santa Fe, which entered the market for smaller amount. An idle Pittsburgh district rail mill is likely to be scheduled for production during the next week.

The Southern Pacific has asked authority to issue \$7,575,000 in equipment trust certificates to aid in the purchase of 28 oil burning and 12 coal burning locomotives and 28 steel lightweight passenger cars. The oil burning locomotives will be built by the Baldwin Locomotive Works, the coal burning locomotives by the Lima Locomotive Works and the passenger cars by the Pullman-Standard Car Mfg. Co. The total cost of the equipment will be \$9,468,750.

Seaboard Air Line has ordered two streamlined lightweight passenger trains. The 14 passenger cars required will be built by Edward G. Budd Mfg. Co., while Electro-Motive Corp. will supply two diesel-electric locomotives.

Board of Transportation, City of New York, has issued formal inquiry for 150 passenger cars with option to purchase an additional 100 or 150. The New York, New Haven and Hartford is contemplating the purchase of 25 cabooses and American Car & Foundry Co. has received authorization to build 10 8000-gal. tank cars by the fusion-weld process for experimental service in transportation of petroleum products.

Wabash Railway was authorized by the Federal Court at St. Louis to equip 50 auto box cars with upper decks and with non-harmonic truck springs and improved brake beam suspension for loading farm tractors, to

cost \$12,944, and to make general repairs on these cars at an estimated cost of \$13,000.

TUBULAR GOODS

... Two pipe lines expected to be placed soon

TOTAL pipe sales at PITTSBURGH so far in July are approximately on a par with the June total and somewhat lower than in May. Oil country goods continue moderately active and pipe manufacturers are awaiting the placing of several sizable awards. Shipments of one seller producing tubular goods for a variety of consumers for the first 24 days of July were within 1 per cent of the total in the like period of June.

Principal interest around CLEVELAND centers upon two Middle Western pipe lines expected to be awarded before long. Standard pipe and oil country casing show very little change over other recent weekly periods.

Reinstatement of an application seeking authorization from the Federal Power Commission for permission to construct a natural gas pipe line from central Kentucky into central Indiana was requested last week by the General Gas Pipe Line Corp., of Indianapolis. In its application for a certificate of public convenience and necessity the company proposed to construct and maintain a 20-in. natural gas pipe line approximately 130 miles in length from gas fields in Kentucky to central Indiana for the purpose of selling natural gas at wholesale only to industrials and utilities. The applicant also proposes to construct approximately 40 miles of 3, 4, 6 and 8-in. gathering lines. The original application was filed Jan. 21, 1939, and a hearing was set for April 17, but was

suddenly terminated, and the commission granted a motion to dismiss the application without prejudice, when council for the company refused to disclose information regarding its reserves of natural gas, method of financing the proposed project or the company's available market.

BOLTS, NUTS AND RIVETS

... Orders are running ahead of the June rate

JULY orders of CLEVELAND producers remain perceptibly better than those of June. Cap screw manufacturers also report improvement this month, although biggest impetus is expected to be provided by automotive releases later. Cumulative shipments of the entire bolt, nut and rivet industry up to July 1 were around one-third in excess of the comparable period last year.

TIN PLATE

... Operations at 65% are slightly improved

OPERATIONS are at 65 per cent, a gain of a point over last week, although specifications, which have been erratic recently, dropped off rather sharply for some producers the past week.

R. C. Neal Co., Buffalo, has been appointed distributor for the products of the Progressive Welder Co., Detroit, according to an announcement by Fred Johnson, president. George Schlecker, of the Neal company will be in direct charge of sales of Progressive welding machines and equipment in the Buffalo area, comprising northwestern New York state and northeastern Pennsylvania counties. The Neal company maintains offices in Syracuse and Rochester in addition to Buffalo.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	July 25, 1939	July 18, 1939	June 27, 1938	July 26, 1938	1939	1938
Fabricated structural steel awards . . .	19,150	19,150	12,850	8,025	580,725	381,055
Fabricated plate awards . . .	870	355	125	4,240	95,205	79,345
Steel sheet piling awards . . .	1,790	300	2,200	700	42,055	28,310
Reinforcing bar awards . . .	11,535	7,220	17,125	2,800	282,250	161,225
Total Letting of Construction Steel . . .	33,345	27,025	32,300	15,765	1,000,235	649,935

IRON AND STEEL SCRAP

... Markets maintain strength as operations rise, but mill buying is absent . . . Composite up 9c., to \$15.13.

JULY 25—With steel mill operations at a new peak for the year, the scrap trade is obviously bullish, but is puzzled by the continued absence of any substantial mill buying. An increase of 9c. in THE IRON AGE composite price to \$15.13 is largely a reflection of the sentiment among scrap sellers since the only factor in the average to show an increase was the Chicago price of No. 1 heavy melting, up 25c. on the basis of broker-dealer transactions. There have been no new sales in any important market. In fact, because of the absence of mill buying at St. Louis dealers there have reduced buying prices on some items. Buying prices at Detroit advanced 50c. to \$1, largely due to coverages on old orders to Valley mills. New buying is expected before long.

Month-end purchases by the Japanese, the first in two months, were the smallest in years. Export demands, however, are taxing supplies at both Philadelphia and Boston, where buying prices on No. 1 steel advanced 25c.

Pittsburgh

No large sales of scrap were reported in the Pittsburgh district the past week but the market remains strong, buoyed up by indications of further increases in the steel melting rate and a scarcity of some grades of scrap in this area. Railroad heavy melting is quoted 25c. higher at \$16.50 to \$17 while other principal grades are unchanged. No. 1 heavy melting is firm at \$15.50 to \$16.

Chicago

It is well nigh impossible for brokers to buy heavy melting steel in Chicago for less than \$14 a gross ton, and even this price will not produce a large tonnage. As a broker buying figure \$13.75 has nearly disappeared, though the district's leading mill buyer of scrap still insists he will pay no more than this. The price of \$13.75 also marks the last mill sale in this area. Heavy melting is being marked up 25c. a ton this week on the basis of broker-dealer transactions. Whether this market will continue to rise depends upon how much scrap mills have on hand and on order. If they can outwait the current burst of bullishness, they may obtain the \$13.75 price, but if the trend of rising operations forces them to buy at all soon, \$14 or more may be the figure. Two railroad lists sold last week at approximately \$14.50 a gross ton delivered Chicago mill.

Philadelphia

There have been no further sales of melting steel since those reported a week

ago, but prices continue very strong at \$15.50 to \$16 a ton for No. 1 and \$13.50 to \$14 for No. 2. Coinciding with the recent increases in foundry operations, interest in the cast grades has heightened in the past two weeks. The last sales of No. 1 cast were made at \$17, up 50c. from the previous price. Export demands continue to draw all available supplies to Port Richmond and loading activity there is unabated. Prices on export material remain unchanged.

Luria Brothers & Co. have purchased the buildings, equipment and inventory of the Reading and Danville, Pa., plants of the Reading Iron Co. It is planned to sell such equipment as is reusable and scrap the balance.

Youngstown

The market continues to show strength, partly reflected from activity at Pittsburgh and Cleveland. With shipments being regulated a little at some valley points, old orders are sufficient for the time being, but new buying is expected before long.

Cleveland

With mill operations in the Cleveland-Lorain district up to 70 per cent this week, scrap is being taken in freely. At this writing there have been no new sales to justify published advances, but a few items are marked upward for better alignment with actual conditions.

Buffalo

No sales of any consequence have been reported this week and the market is temporarily quiet. Dealers are encouraged by the increased rate of steel operations and feel that it may lead to some early buying of scrap by the mills. Cast scrap continues to move by the occasional carload.

St. Louis

Although offerings of scrap iron from country dealers are small and they are disinclined to sell at present prices, the steel mills in St. Louis area decline to buy. Result is a decline of 25c. a ton in Nos. 1 and 2 heavy melting steel, No. 2 railroad wrought and railroad malleable. Cast iron car wheels, of which there is a scarcity, are up 50c. a ton. Railroad lists: Pennsylvania, 27,300 tons; Chicago, Rock Island & Pacific, and Union Pacific, 3000 tons each; Chicago, Burlington & Quincy, 2900 tons, and Gulf Coast Lines, 1000 tons.

Cincinnati

With dealers holding their material and mills refusing to pay better prices for current material, the old materials market in this area is in a technically strong position. Dealers' bids are unchanged currently, but with any improvement in demand generally, the upward trend of prices that was started last week is expected to materialize still further. Ship-

ment against continuing contracts is about at the same rate that has prevailed for the past several months.

Detroit

Detroit prices on iron and steel scrap advanced sharply during the last week after a period of marking time and general sales lassitude. Principally, pressure arising from movement of scrap away from Detroit to Canton, Youngstown and Canadian points is credited with having pushed prices upward as much as \$1 on some items. In general, dealers buying prices were increased 50c. a ton. There is strong likelihood that competitive buying on automotive scrap lists about Aug. 1 will bring to light further price increases. Outstanding movements during the last week have been increases of approximately \$1 a ton on new factory bushings and low phos. plate. Substantial gains also were noted when long turnings went to \$6 per ton maximum, a 75c. increase.

Boston

The market for materials in demand is stronger. Exporters, finding supplies of No. 1 steel comparatively short, have advanced prices on sizable tonnages 25c. a ton to \$14.25, delivered dock. No sales at less than \$14 a ton, delivered, are reported, up 50c. from the early July market. No. 2 steel at \$12.75 a ton apparently has disappeared, the market today being \$13 a ton, delivered, flat. Eastern Pennsylvania consumers are buying turnings, the market for which is now \$3.60 to \$3.75 a ton on cars. Previously \$3.38 a ton on cars was paid for Pittsburgh delivery. Bundled skeleton is up 50c. a ton at \$8.15 on cars. Breakable cast is bid \$10 a ton on cars for Pennsylvania delivery, but if it is to be broken up for foundry and New England mill consumption the price is 50c. a ton lower.

New York

For the first time since the latter part of May the Japanese made some additional purchases of scrap iron, but the amounts placed were the smallest in years, averaging a few thousand tons apiece for the principal sellers. Delivery on current European orders is expected to extend throughout 1939 and no new orders are looked for until the end of the year. Buying prices are unchanged.

The Trojan Scrap Iron Corp., Troy, N. Y., has purchased the rolling mill of the Burden Iron Co., established at Troy, in 1813, and is now engaged in scrapping the plant, which made wrought iron in puddling furnaces.

Toronto

Iron and steel scrap markets failed to show much change from the preceding week. Prices held unchanged and dealers state that offerings from rural dealers and collection are slow although sufficient scrap is reaching yards to take care of demand. Mills are taking delivery of heavy melting steel against contract and foundries are in the market for machinery cast. Stove plate is again in light demand although the buying of the previous week cleaned out a large part of the available stocks in the hands of dealers. Turnings, borings and bushings are moving slowly.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.50 to \$16.00
Railroad hvy. mltng.	16.50 to 17.00
No. 2 hvy. mltng. steel.	13.75 to 14.25
Scrap rails	16.25 to 16.75
Rails 3 ft. and under	17.50 to 18.00
Comp. sheet steel	15.50 to 16.00
Hand bundled sheets	14.50 to 15.00
Hvy. steel axle turn.	14.00 to 14.50
Machine shop turn	9.00 to 9.50
Short shov. turn	10.50 to 11.00
Mixed bor. & turn	8.00 to 9.00
Cast iron borings	8.00 to 9.00
Cast iron carwheels	15.00 to 15.50
Hvy. breakable cast	12.50 to 13.00
No. 1 cupola cast	15.00 to 15.50
RR. knuckles & cplrs.	17.50 to 18.00
Rail coil & leaf springs	18.00 to 18.50
Rolled steel wheels	18.00 to 18.50
Low phos. billet crops	18.50 to 19.00
Low phos. punchings	17.50 to 18.00
Low phos. plate	16.00 to 17.00

PHILADELPHIA

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.50 to \$16.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Hydraulic bund., new.	15.00 to 15.50
Hydraulic bund., old.	11.50 to 12.00
Steel rails for rolling.	17.00 to 17.50
Cast iron carwheels	16.00
Hvy. breakable cast	15.00 to 15.50
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00
Railroad malleable	15.50 to 16.00
Machine shop turn	8.00 to 8.50
No. 1 blast furnace	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings	10.00 to 10.50
No. 1 low phos. hvy.	17.00 to 17.50
Couplers & knuckles	17.50 to 18.00
Rolled steel wheels	17.50 to 18.00
Steel axles	20.00 to 20.50
Shafting	20.50 to 21.00
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire	12.00 to 12.50
Cast boring (chem.)	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:	
Per Gross Ton	
Hvy. mltng. steel	\$13.75 to \$14.00
Auto. hvy. mltng. steel	
alloy free	12.50 to 13.00
No. 2 auto steel	11.00 to 11.50
Shoveling steel	13.75 to 14.00
Factory bundles	12.75 to 13.25
Dealers' bundles	11.75 to 12.25
Drop forge flashings	10.00 to 10.50
No. 1 busheling	12.50 to 13.00
No. 2 busheling, old	5.75 to 6.25
Rolled carwheels	14.50 to 15.00
Railroad tires, cut	15.00 to 15.50
Railroad leaf springs	14.50 to 15.00
Steel coup. & knuckles	14.50 to 15.00
Axle turnings	12.50 to 13.00
Coil springs	16.50 to 17.00
Axle turn. (elec.)	13.50 to 14.00
Low phos. punchings	15.50 to 16.00
Low phos. plates 12 in. and under	15.00 to 15.50
Cast iron borings	6.50 to 7.00
Short shov. turn	6.50 to 7.00
Machine shop turn	6.50 to 7.00
Rerolling rails	18.00 to 18.50
Steel rails under 3 ft.	16.00 to 16.50
Steel rails under 2 ft.	16.50 to 17.00
Angle bars, steel	15.25 to 15.75
Cast iron carwheels	12.50 to 13.00
Railroad malleable	15.00 to 15.50
Agric. malleable	12.00 to 12.50

Per Net Ton	
Iron car axles	\$18.00 to \$18.50
Steel car axles	17.50 to 18.00
Locomotive tires	13.00 to 13.50
Pipes and flues	8.50 to 9.00
No. 1 machinery cast	12.00 to 12.50
Clean auto. cast	12.50 to 13.00
No. 1 railroad cast	11.00 to 11.50
No. 1 agric. cast	10.00 to 10.50
Stove plate	7.75 to 8.25
Grate bars	7.75 to 8.25
Brake shoes	9.50 to 10.00

YOUNGSTOWN

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$15.25 to \$15.75
No. 2 hvy. mltng. steel.	14.25 to 14.75
Low phos. plate	16.50 to 17.00
No. 1 busheling	14.25 to 14.75
Hydraulic bundles	14.75 to 15.25
Machine shop turn	9.00 to 9.50

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Comp. sheet steel	14.25 to 14.75
Light bund. stampings	11.00 to 11.50
Drop forge flashings	11.50 to 12.00
Machining shop turn	7.50 to 8.00
Short shov. turn	8.00 to 8.50
No. 1 busheling	13.50 to 14.00
Steel axle turnings	10.50 to 11.00
Low phos. billet and bloom crops	18.50 to 19.00
Cast iron borings	8.00 to 8.50
Mixed bor. & turn	8.00 to 8.50
No. 2 busheling	8.25 to 8.75
No. 1 cupola cast	15.50 to 16.00
Railroad grade bars	11.00 to 11.50
Stove plate	9.00 to 9.50
Rails under 3 ft.	17.75 to 18.25
Rails for rolling	18.25 to 18.75
Railroad malleable	15.50 to 16.00
Cast iron carwheels	14.00 to 14.50

BIRMINGHAM

Per gross ton delivered to consumer:	
Hvy. melting steel	\$13.00
Scrap steel rails	\$13.50 to 14.00
Short shov. turnings	7.50
Stove plate	9.50
Steel axles	18.50
Iron axles	18.50
No. 1 RR. wrought	10.00
Rails for rolling	16.00 to 16.50
No. 1 cast	15.00
Tramcar wheels	14.50 to 15.00

DETROIT

Dealers' buying prices per gross ton:	
No. 1 hvy. mltng. in-	\$10.50 to \$11.00
No. 2 hvy. mltng. steel	9.50 to 10.00
Borings and Turnings	5.50 to 6.00
Long turnings	5.50 to 6.00
Short shov. turnings	6.25 to 6.75
No. 1 machinery cast	13.00 to 13.50
Automotive cast	13.50 to 14.00
Hvy. breakable cast	9.50 to 10.00
Stove plate	8.00 to 8.50
Hydraul. comp. sheets	11.75 to 12.25
New factory bushel	10.50 to 11.00
Sheet clippings	7.75 to 8.75
Flashings	10.00 to 10.50
Low phos. plate scrap	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton on cars:	
No. 1 hvy. mltng. steel	\$11.00 to \$11.50
No. 2 hvy. mltng. steel	8.50 to 9.00
Hvy. breakable cast	10.50 to 11.00
No. 1 machinery cast	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Steel car axles	15.00 to 15.50
Shafting	15.00 to 15.50
No. 1 RR. wrought	11.00 to 11.50
No. 1 wrought long	9.50 to 10.00
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Clean steel turnings	4.00 to 4.50
Cast borings	3.50 to 4.00
No. 1 blast furnace	3.50 to 4.00
Cast borings (chem.)	9.50 to 10.00
Unprepared yard scrap	6.00 to 6.50
Light iron	3.00 to 3.50

Per gross ton, delivered local foundries:

No. 1 machin. cast†

No. 2 cast†

10.50 to 11.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton

Rerolling \$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton

Pittsburgh, Chicago or Cleveland \$43.00
Worcester, Mass. 45.00
Birmingham 43.00
San Francisco 52.00
Rods over 9/32 in. or 47/64 in., inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.00c.
On cars dock Tex. Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.80c. to 2.05c.
Detroit, delivered 1.90c. to 2.15c.
On cars dock Tex. Gulf ports 2.15c. to 2.40c.
On cars dock Pacific ports 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 1.70c. to 1.90c.
Detroit, delivered 1.80c. to 2.00c.
On cars dock Tex. Gulf ports 2.05c. to 2.25c.
On cars dock Pacific ports 2.35c.

IRON BARS

Chicago and Terra Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 10,000 to 19,000 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Clayton, Del. 2.10c.* Philadelphia, del'd 2.05c. to 2.15c.
New York, del'd 2.19c. to 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg. 3.80c.

* Subject to concessions, particularly in the East, of \$2 a ton.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton \$40.00

Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton \$40.00

Light rails (from rail steel) per gross ton 39.00

Base per Lb.

Cut spikes 3.00c.

Screw spikes 4.55c.

Tie plates, steel 2.15c.

Tie plates, Pacific Coast ports 2.25c.

Track bolts, to steam railroads 4.18c.

Track bolts to jobbers, all sizes

(per 100 counts) 65.5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.00c.

Detroit, delivered 2.10c.

Philadelphia, delivered 2.17c.

Granite City 2.10c.

On cars dock Pacific ports 2.50c.

Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.05c.

Detroit, delivered 3.15c.

Granite City 3.15c.

Philadelphia, delivered 3.37c.

On cars dock Pacific ports 3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

From May 10 up to and including May 15, reductions from the base price of hot and cold rolled sheets running from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15.

Subsequent to May 15, many orders originally placed at \$4 to \$6 below the base price were adjusted to the full \$8 concession.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.

Philadelphia, del'd 3.67c.

Granite City 3.60c.

On cars dock Pacific ports 4.00c.

Wrought iron, Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.

Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.55c.
Transformer 52	8.45c.

Silicon Strip in coils—Sheet price plus \$1.00 per sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating	3.80c.
f.o.b. Pittsburgh or Gary	3.80c.
F.o.b. cars dock Pacific ports	4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, del'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box

Standard cokes, Pittsburgh, Chicago and Gary	\$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 16 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

Per Base Box

Granite City	\$4.40
Pittsburgh or Gary	4.30

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	\$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.00c.
Detroit, delivered	2.10c.

Cooperage Stock

Pittsburgh & Chicago	2.10c.
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From May 10 up to and including May 15, reductions in the base price of hot rolled strip running from \$4 to \$8 a ton were prevalent. Concessions withdrawn on May 15.

Subsequent to May 15, many orders originally placed at \$4 to \$6 below the base price were adjusted to the full \$8 concession.

COLD ROLLED STRIP*

Base per Lb.

Pittsburgh, Youngstown or Cleveland	2.80c.
Chicago	2.90c.
Detroit, delivered	2.90c.
Worcester	3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	2.95c.
Detroit, delivered	3.05c.
Worcester	3.35c.

From May 10 up to and including May 15, reductions from the base price of cold rolled strip amounting to \$4 a ton were prevalent. Concessions withdrawn on May 15.

COLD ROLLED SPRING STEEL

Pittsburgh and

Cleveland Worcester

Carbon	0.26-0.50%	2.80c.	3.00c.
Carbon	0.51-0.75	4.30c.	4.50c.
Carbon	0.76-1.00	6.15c.	6.35c.
Carbon	1.01-1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

Per Lb.

Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

Base per Keg

Standard wire nails	\$2.40
Coated nails	2.40
Cut nails, carloads	3.60

Base per 100 Lb.

Annealed fence wire	\$2.90
Galvanized fence wire	3.30
Polished staples	3.10
Galvanized staples	3.35
Twisted barbless wire	3.25
Woven wire fence, base column	67
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	\$2.58
Stand. 2 pt., 12.5 gage barbed hog wire, per 80 rod spool	\$2.76

Note: Birmingham base same on above items, except spring wire.

Add \$4 a ton for Mobile, Ala.; \$5 for New Orleans; \$8 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are \$1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel	Wrought Iron
In. Black Galv.	In. Black Galv.
1/8 ... 56	36
1/4 to 3/8	43 1/2
1/2 ... 63 1/2	54
3/4 ... 66 1/2	60 1/2
1 to 3 ... 68 1/2	60 1/2

Lap Weld

2 ... 61	52 1/2
2 1/2 & 3 ... 64	55 1/2
3 1/2 to 6.66	57 1/2
7 & 8.65	55 1/2
9 & 10.64 1/2	55
11 & 12.63 1/2	54

Butt weld, extra strong, plain ends

1/8 ... 54 1/2	41 1/2
1/2 to 3 ... 56 1/2	45 1/2
1/2 ... 61 1/2	37 1/2
3/4 to 6.66 1/2	59
7 & 8.65 1/2	56
9 & 10.64 1/2	55
11 & 12.63 1/2	54

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount of \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Lap Weld	
Cold Drawn	Hot Rolled	
1 in. o.d. ... 13 B.W.G.	\$ 9.01	7.82
1 1/2 in. o.d. ... 13 B.W.G.	10.67	9.26
1 1/2 in. o.d. ... 13 B.W.G.	11.70	10.23
1 1/2 in. o.d. ... 13 B.W.G.	15.03	13.94
2 1/2 in. o.d. ... 13 B.W.G.	16.76	14.54
2 1/2 in. o.d. ... 12 B.W.G.	18.45	16.01
2 1/2 in. o.d. ... 12 B.W.G.	20.21	17.54
2 1/2 in. o.d. ... 12 B.W.G.	21.42	18.59
3 in. o.d. ... 12 B.W.G.	22.48	19.50
3 1/2 in. o.d. ... 11 B.W.G.	28.37	24.62
4 in. o.d. ... 10 B.W.G.	35.20	30.54
4 1/2 in. o.d. ... 10 B.W.G.	43.04	37.35
5 in. o.d. ... 9 B.W.G.	54.01	46.87
6 in. o.d. ... 7 B.W.G.	82.95	71.96

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	\$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, \$3 extra
4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$42, Birmingham, and \$5 delivered Chicago and 4-in. pipe, \$45, Birmingham, and \$54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland
Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
1/2 in. and 6 in. and smaller	68 1/2
Larger and longer up to 1 in.	66
1 1/8 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclusive	64
1 1/8 in. and larger	62

In full container lots, 10 per cent
additional discount.

Stove bolts in packages, nuts
attached

Stove bolts in packages, with
nuts separate

Stove bolts in bulk

On stove bolts freight is allowed to destination
on 200 lb. and over.

Large Rivets

(1/2 in. and larger)

Base Per 100 Lb.

F.o.b. Pittsburgh, Cleveland,
Chicago, Birmingham ... \$3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland
Chicago, Birmingham ... 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread 1/4 in. and smaller	70
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	67 1/2
Upset set screws, cup and oval points	75
Milled studs	60

Alloy Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton,
Massillon, Buffalo, Bethlehem.

Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo,
Bethlehem, Massillon or Canton.

Open-hearth grade, base

Delivered, Detroit

S.A.E.

Series

Numbers

200 (1/2% Nickel)

per 100 Lb.

\$0.35

2100 (1 1/2% Nickel) ... \$0.75

2300 (3 1/2% Nickel) ... 1.55

2500 (5% Nickel) ... 2.25

3100 Nickel-chromium ... 0.70

3200 Nickel-chromium ... 1.85

3300 Nickel-chromium ... 3.30

3400 Nickel-chromium ... 3.20

4100 Chromium-molybdenum
(0.15 to 0.25 Molybdenum) 0.55

4100 Chromium-molybdenum
(0.25 to 0.40 Molybdenum) 0.75

4340 Chr.-Ni.-Mo. ... 1.65

4345 Chr.-Ni.-Mo. ... 1.55

4600 Nickel-molybdenum (0.20
to 0.30 Mo. 1.50 to 2.00 Ni.) 1.10

5100 Chrome steel (0.60-0.90 Cr.) 0.35

5100 Chrome steel (0.80-1.10 Cr.) 0.45

6100 Chromium spring steel ... 0.15

6100 Chromium-vanadium bar ... 1.20

6100 Chromium-vanadium
spring steel ... 0.85

Chromium-nickel vanadium ... 1.50

Carbon-vanadium ... 0.35

These prices are for hot-rolled steel bars. The
differential for most grades in electric furnace
steel is 50c. higher. Slabs with a section area
of 16 in. and 2 1/2 in. thick or over take the billet
base.

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb.
f.o.b. Pittsburgh)

Chrome-Nickel

No. 304	No. 302
Forging billets ... 21.25c.	20.10c.
Bars ... 25c.	24c.
Plates ... 29c.	27c.
Structural shapes ... 25c.	24c.
Sheets ... 36c.	34c.
Hot-rolled strip ... 23.50c.	21.50c.
Cold-rolled strip ... 30c.	28c.
Drawn wire ... 25c.	24c.

Straight Chrome

No. 410 No. 430 No. 442 No. 446

Bars 18.50c. 19c. 22.50c. 27.50c.

Plates 21.50c. 22c. 25.50c. 30.50c.

Sheets 26.50c. 29c. 32.50c. 36.50c.

Hot stp. 17c. 17.50c. 24c. 35c.

Cold stp. 22c. 22.50c. 32c. 52c.

TOOL STEEL

High speed ... 67c.

High-carbon-chrome ... 43c.

Oil-hardening ... 24c.

Special ... 22c.

Extra ... 18c.

Regular ... 14c.

Prices for warehouse distribution to all points
on or East of Mississippi River are 2c. a lb.
higher. West of Mississippi quotations are 3c.
a lb. higher.

British and Continental

BRITISH

Per Gross Ton Gold f.
f.o.b. United Kingdom Ports

Ferromanganese, ex-
port ... Nominal

Tin plate, per base
box ... 20s. 3d. to 21s.

Steel bars, open hearth ... £10 8s.

Beams, open hearth ... £10 5s.

Channels, open hearth ... £10 5s.

Angles, open-hearth ... £10 5s.

Black sheets, No. 24 gage. £13

Galvanized sheets, No. 24
gage ... £15 15s.

CONTINENTAL

Per Gross Ton Gold f.
f.o.b. Continental Ports

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$22.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 28c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$21.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	\$22.00
F.o.b. Everett, Mass.	23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. \$26.50

Gray Forge

Valley or Pittsburgh furnace... \$20.50

Charcoal

Lake Superior furnace \$25.00
Delivered Chicago 28.34

Canadian Pig Iron

Per Gross Ton

Montreal

Foundry iron \$24.50 base
Malleable 25.00 base
Basic 24.50 base

Toronto

Foundry iron \$22.50 base
Malleable 23.00 base
Basic 22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) \$80.00

Spiegelzincen

Per Gross Ton Furnace

Domestic, 19 to 21% \$28.00

Domestic, 26 to 28% 33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk) \$69.50*

50% (ton lots in 50 gal. bbl.) 80.50*

75% (carload lots, bulk) 126.00*

75% (ton lots in 50 gal. bbl.) 139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50% \$30.50

For each additional 0.50% silicon up to 12%.

50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50% \$24.50

For each additional 0.5% silicon up to 12%.

50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon 10.50c.*

2% carbon 16.50c.*

1% carbon 17.50c.*

0.10% carbon 19.50c.*

0.06% carbon 20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon \$83.00

2.50% carbon 88.00

2% carbon 93.00

1% carbon 103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads.... \$1.75

Ferrotungsten, 100 lbs. and less 2.00

Ferrovanadium, contract, per lb. contained V., delivered \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots \$2.25†

Ferrocobaltitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton \$142.50

Ferrocobaltitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton \$157.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville \$75.00

Ferromolybdenum, per lb. Mo. f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo. f.o.b. furnace 80c.

Molybdenum oxide briquettes

48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

* Spot prices are \$5 per ton higher.

† Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50% \$5.25

Old range, non-Bessemer, 51.50% 5.10

Messabi, Bessemer, 51.50% 5.10

Messabi, non-Bessemer, 51.50% 4.95

High phosphorus, 51.50% 4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria 12c.

Iron, low phos., Swedish, average, 68 1/4% iron 12c.

Iron, basic or foundry, Swedish, aver. 65% iron 10 1/2c.

Iron, basic or foundry, Russian, aver. 65% iron Nominal

Man., Caucasian, washed 52% 29c.

Man., African, Indian, 44-48% 25c.

Man., African, Indian, 49-51% 30c.

Man., Brazilian, 46 to 48% 27c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered \$18.00

Tungsten, domestic, scheelite delivered \$16.00 to \$17.00

Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade) \$15.00

Rhodesian, 45% 19.00

Rhodesian, 48% 22.00

Turkish, 48-49% 22.50

Turkish, 45-56% 19.50

Turkish, 40-41% 17.00

Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:

50% \$34.00

48-49% 23.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail \$17.00

Domestic, f.o.b. Ohio River landing barges \$18.00 to 19.00

No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines 18.00

Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f.

Atlantic ports, duty paid 21.50

Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines 31.50

COKE

Per Net Ton

Furnace, f.o.b. Connells-ville, Prompt \$3.75

Furnace, f.o.b. Connells-ville, Prompt \$4.75 to 5.50

Foundry, by - product Chicago ovens 10.25

Foundry, by - product, del'd New England 12.50

Foundry, by - product, del'd Newark or Jersey City 10.88 to 11.40

Foundry, by - product, Philadelphia 10.95

Foundry, by - product, delivered Cleveland 10.30

Foundry, by - product, delivered Cincinnati 9.75

Foundry, by - product, del'd Birmingham 7.50

Foundry, by - product, del'd St. Louis industrial district 10.75 to 11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports 14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
Plates	3.40c.
Shapes	3.40c.
Soft steel bars and small shapes	3.35c.
Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.65c.
Hot rolled strip	3.60c.
Hot rolled sheets	3.35c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb. kegs)	2.65c.

On plates, structural, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and carting charge.

All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
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Plates, $\frac{1}{4}$ in. and heavier	3.75c.
Structural shapes	3.75c.
Soft steel bars, round	3.84c.
Iron bars, Swed. char-coal	7.25c.
Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.09c.
Flats up to 12 in. wide	4.09c.
Cold-rolled strip soft and quarter hard	3.51c.
Hot-rolled strip, soft O.H.	3.96c.
Hot-rolled sheets (8-30 ga.)	3.40c.
Galv. sheets (24 ga.)	4.50c.
Long ternes (24 ga.)	5.50c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.35c.
SAE, 3100, hot-rolled	5.90c.
SAE, 6100, hot-rolled annealed	8.75c.
SAE, 2300, cold-rolled	8.59c.
SAE, 3100, cold-rolled, annealed	8.19c.
Floor plate, $\frac{1}{2}$ in. and heavier	5.56c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.35c.
Wire, galv. (No. 9)	4.70c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in lots of five kegs or more	\$2.65

*For lots less than 2000 lb.

CHICAGO

	Base per Lb.
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Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.50c.
Soft steel squares, hexagons, channels and Tees	3.65c.
Hot rolled strip	3.60c.
Floor plates	5.15c.
Hot rolled sheets	3.35c.
Galvanized sheets	4.25c.
Cold rolled sheets	4.30c.
Cold finished carbon bars	3.75c.
Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.	

CLEVELAND

	Base per Lb.
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Plates	3.40c.
Structural shapes	3.58c.
Soft steel bars	3.25c.
Reinfor. bars (under 2000 lb.)	2.55c.
Cold-fin. bars (1000 lb., over)	3.75c.
Hot-rolled strip	3.50c.
Cold rolled sheets	4.55c.
Cold-finished strip	3.20c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.35c.
Floor plates, 3/16 in. and heavier	5.18c.
*Black ann'l'd wire, per 100 lb.	\$3.10
*No. 9 galv. wire, per 100 lb.	3.50
Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	5.85c.
Cold rolled alloy steel (3115)	6.75c.

* For 5000 lb. or less.

† 500 lb. base quantity.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 300 lb. and under.

ST. LOUIS

	Base per Lb.
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Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.62c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.77c.
Cold fin. rounds, shafting, screw stock	4.02c.
Galv. sheets (24 ga.)	4.53c.
Hot rolled sheets	3.38c.
Galv. corrugated sheets, 24 ga. and heavier	4.58c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
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Structural shapes, 3 in. and larger	3.85c.
Plates, $\frac{1}{4}$ in. and heavier	3.85c.
Bars	3.88c.
Heavy hot rolled sheets	3.71c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.61c.
Galvanized sheets	4.61c.
Cold rolled sheets	4.71c.

The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb., plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb., minus 20c.; 10,000 to 39,999 lb., minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

	Base per Lb.
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Plates	3.62c.
Floor plates	5.25c.
Struc. shapes	3.40c.
Soft steel bars	3.35c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	3.65c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl., also sizes	
No. 8 to 30 ga.	3.35c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.82c.

NEW ORLEANS

	Base per Lb.
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Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55c.
Bolts and nuts, per cent off list 60	

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis	\$6.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore and Plymouth Meeting and Chester	\$47.00
Chemically bonded f.o.b. Baltimore and Plymouth Meeting and Chester, Pa.	47.00
Standard f.o.b. Baltimore and Chester	\$67.00
Chemically bonded f.o.b. Baltimore and Chester, Pa.	57.00

Grain Magnesite

Net per Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	\$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PHILADELPHIA

Base per Lb.

Plates, $\frac{1}{4}$ -in. and heavier	3.40c.
Structural shapes	3.40c.
Soft steel bars, small shapes, iron bars (except bands), deformed	3.60c.
Reinforced steel bars	4.06c.
Steel hoops	4.10c.
Steel bands, No. 12 and 3/16 in.	3.60c.
Spring steel	4.75c.
Hot-rolled anneal. sheets	3.40c.
Galvanized sheets (No. 24)	4.25c.
Diam. pat. floor plates, $\frac{1}{4}$ in.	5.00c.

These prices are for delivery in Philadelphia trucking area.

*For quantities between 400 and 1999 lb.

†For 10 bundles or over.

‡For one to five tons.

BIRMINGHAM

Base per Lb.

Bars and bar shapes	3.50c.
Structural shapes and plates	3.55c.
Hot rolled sheets No. 10 ga.	3.35c.
Galvanized sheets No. 24 ga.	4.75c.
or more	

Strip

Reinforcing bars

Floor plates

Cold finished bars

Machine and car-

riage bolts

Rivets (structural) \$4.60 base

On plates, shapes, bars, hot-rolled strip, heavy hot-rolled sheets, the base applies on 400 to 1999 lb. All prices are f.o.b. consumer plant.

PACIFIC COAST

Base per Lb.

San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.4	

FABRICATED STEEL

... Lettings in fair volume at 19,150 tons . . . New projects higher at 16,850 tons . . . Plate awards call for 870 tons.

NORTH ATLANTIC STATES AWARDS

4200 Tons, Washington, office building for Lafayette Corp., to Taylor-Fichter Steel Construction Co., New York, through Thompson Starett Co., Inc., New York; sub-contract for fabrication to Fort Pitt Bridge Works Co., Pittsburgh. (This is a correction of award published last week.)
 2210 Tons, Brooklyn, Mill Basin bridge, contract MS-39-3-C to Bethlehem Steel Co., Bethlehem, Pa.
 1365 Tons, New York, Airways Terminal, 42nd Street and Park Avenue, to Lehigh Structural Steel Co., Allentown, Pa.
 550 Tons, Washington, general Federal office building, to American Bridge Co., Pittsburgh.
 500 Tons, Philadelphia, crane runway, New York Shipbuilding Corp., to Lehigh Structural Steel Co., Allentown, Pa.
 490 Tons, Camden, N. J., addition to shipyard crane runways, to Lehigh Structural Steel Co., Allentown, Pa.
 400 Tons, Esperance, N. Y., State bridges, FAS-SS-39-2, to Lackawanna Steel Construction Co., Buffalo.
 370 Tons, Bloomfield, N. J., State bridges, route 6, section 11-A, to American Bridge Co., Pittsburgh.
 370 Tons, Wawarsing, N. Y., Rondout Creek bridge, contract 341, to American Bridge Co., Pittsburgh.
 270 Tons, Harrisburg, Pa., Social Security building, to Morris Wheeler & Co., Philadelphia.
 225 Tons, Buffalo, Hopkins Street bridge, to Bethlehem Steel Co.
 205 Tons, Pittsburgh, Bedford dwellings, to American Bridge Co., Pittsburgh.
 200 Tons, Bangor, Me., two schools, to Lyons Iron Works, Manchester, N. H.; D. A. Sullivan & Sons, Inc., Northampton, Mass., contractor.
 175 Tons, Gordon's Corner, N. J., underpass, to American Bridge Co., Pittsburgh.
 170 Tons, Pottstown, Pa., building for Vaughan Knitting Mills, to Bethlehem Steel Co., Bethlehem, Pa.
 160 Tons, Brooklyn, Shore Parkway bridge, contract MS-39-14A, to Bethlehem Steel Co., Bethlehem, Pa.

SOUTH AND SOUTHWEST

2000 Tons, New Orleans, addition to Tulane University Stadium, to Virginia Bridge Co., Roanoke, Va.
 1410 Tons, Alcoa, Tenn., four buildings for Aluminum Co. of America, to Ingalls Iron Works Co., Birmingham.
 776 Tons, State of Oklahoma, bridge; 500 tons to Kansas City Structural Steel Co., Kansas City, Kan., 276 tons to Capitol Steel & Iron Co., Oklahoma City.
 365 Tons, Texas City, Tex., freight car handling crane, for Seatrains Lines, Inc., to American Bridge Co.
 325 Tons, Pendleton County, Ky., bridge, to Midland Structural Steel Co., Cicero, Ill.
 270 Tons, Coinjock, N. C., double swing highway bridge, to Virginia Bridge Co., Roanoke, Va.
 155 Tons, Hutchinson County, Tex., bridge, to Amarillo Iron Works, Amarillo, Tex.
 110 Tons, Laurel-Jackson Counties, Ky., to Midland Structural Steel Co., Cicero, Ill.

CENTRAL STATES

1880 Tons, Youngstown, Ohio, Cedar Street bridge, to Fort Pitt Bridge Works Co., Massillon, through Hunter Construction Co.
 1000 Tons, Chicago, paint and loading shop for Chicago Bridge & Iron Co., to American Bridge Co.
 776 Tons, Winnetka, Ill., grade separation project, to Milwaukee Bridge Co., Milwaukee.
 700 Tons, Aurora, Ill., raw materials and assembly building, Western Austin Co., to Hansell-Ecock Co., Chicago.
 511 Tons, Chicago, Washburn vocational school, to Reuter Brothers, Chicago.
 432 Tons, Cleveland, William D. Howells School, to Whitehead & Kales, Detroit, through DeHamel Construction Co., Cleveland.
 225 Tons, Chicago, grain elevator, to Gage Structural Steel Co., Chicago.

200 Tons, East St. Louis, Ill., State bridge, route 12, to Bethlehem Steel Co., Bethlehem, Pa.
 200 Tons, Houston County, Minn., bridge, to Lakeside Bridge & Steel Co., Milwaukee.
 185 Tons, Chicago, Chicago Rapid Transit Co., elevated structure repairs, to Hansell-Ecock Co., Chicago.
 160 Tons, Cleveland, receiving building for Cleveland State Hospital, to Fort Pitt Bridge Works Co., Massillon, through H. F. Juergens, Cleveland.
 150 Tons, Chicago, city garage and office building, to A. F. Anderson Iron Works, Chicago.
 150 Tons, Delaware, Ohio, junior fair building and grandstand, to C. E. Morris Co., Columbus, Ohio.
 135 Tons, Bismarck, N. D., Ninth Street, State underpass, to American Bridge Co.
 125 Tons, Laurel, Ill., turntable, Northern Pacific Railroad, to Wisconsin Bridge & Iron Co., Milwaukee.
 125 Tons, Marine City, Mich., Detroit Gasket & Mfg. Co. factory building, to Whitehead & Kales Co., Detroit.
 115 Tons, Dayton, Ohio, incinerator, to Burger Iron Works, Akron, Ohio.

WESTERN STATES

390 Tons, Cajon, Cal., Santa Fe railroad bridge, to American Bridge Co., Pittsburgh.
 200 Tons, Los Altos, Cal., clinker storage structure for cement plant, to Bethlehem Steel Co., San Francisco.
 172 Tons, Los Altos, Cal., sugar rock plant, to Judson Pacific Co., San Francisco.
 120 Tons, Muir, Cal., tunnel supports, to Consolidated Steel Corp., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

1600 Tons, Long Island, N. Y., grade crossing elimination, aqueduct, for Long Island Railroad Co.
 900 Tons, Wilmington, Del., highway bridge, J. A. Bader Co., Wilmington, Del., low bidder.
 400 Tons, Wilmington, Del., building for Continental American Life Co., Turner Construction Co., Philadelphia, general contractor.
 372 Tons, Erie and Niagara Counties, State bridge, project No. R.C. 4045, William J. Gallagher, Medina, N. Y., low bidder (previously reported).
 350 Tons, Cynwyd, Pa., apartment building for J. R. K. Scott.
 325 Tons, Lewisburg, Pa., industries building No. 3 for Federal Prison Industries, Inc.
 300 Tons, Rochester, N. Y., maintenance building for Rochester Gas & Electric Co.
 280 Tons, Monroe County, N. Y., including 30 tons reinforcing steel bridge and approach, highway project R.C. 4060; bids close Aug. 6.

254 Tons, Orange County, N. Y., including 55 tons reinforcing steel, highway project R.C. 4033; bids close Aug. 9.
 220 Tons, Bedford County, Pa., bridge, section 14-A, route 39, Pennsylvania Turnpike Commission.
 200 Tons, Vassalboro, Me., State bridge over Seven Mill Brook.
 200 Tons, Newark, N. J., machine shop building for American Can Co.
 190 Tons, Erie County, N. Y., bridge and approaches, highway project R.C. 4050, William J. Gallagher, Medina, N. Y., low bidder (previously reported).
 175 Tons, Stratford, Conn., State highway bridge.
 175 Tons, Elizabethport, N. J., recreation building for Singer Mfg. Co.

175 Tons, Albany County, N. Y., including 73 tons reinforcing steel, highway project R.C. 4049, Serafini Construction Co., Inc., Binghamton, N. Y., low bidder (previously reported).
 160 Tons, Rensselaer County, N. Y., including 30 tons reinforcing steel, highway project R.C. 4046, W. W. Wyman, Inc., Sherburne Falls, Mass., low bidder (previously reported).
 149 Tons, Allegany County, N. Y., including 31 tons reinforcing steel, highway project F.A.S., R.C. 4055; bids due Aug. 9.

140 Tons, Harrisburg, Pa., building for H. L. Green Co.
 100 Tons, Knightville, Mass., dam.
 100 Tons, Greenville-Monson, Me., two State bridges.

THE SOUTH

900 Tons, Louisville, Ky., State grade separation, Seventh and Magnolia Streets.
 250 Tons, Hiawasseo Dam, Tenn., radial gates, for TVA.

CENTRAL STATES

4200 Tons, Chicago, South Side vocational school; bids in.
 1100 Tons, Blanc, Mich., State grade separation.
 365 Tons, Ontonagon, Mich., State bridge; bids taken July 26.
 175 Tons, Villisca and Charles City, Iowa, State bridges.
 150 Tons, Chicago, Brownell school, bids Aug. 1.
 130 Tons, Macedonia, Ohio, Haworthen Hospital buildings, for State.
 120 Tons, Fife Lake, Mich., State bridge.
 100 Tons, Carroll County, Ohio, State project in Rose township; bids July 29.

WESTERN STATES

2800 Tons, Delta, Cal., Salt Creek and O'Brien Creek bridges, for Bureau of Reclamation; bids Aug. 7.
 300 Tons, Los Altos, Cal., addition for Permanente cement plant.
 225 Tons, Fort Lewis, Wash., completion of four hangars for U. S. Army.
 136 Tons, Shasta Dam, Cal., tunnel supports, A. Teichert & Son, Sacramento, low bidder on general contract.

FABRICATED PLATES

AWARDS

440 Tons, Bethlehem, Pa., water works project, to Bethlehem Steel Co., Bethlehem, Pa.
 327 Tons, Los Angeles, slide gates for Hansen Dam, to Consolidated Steel Co., Los Angeles.
 105 Tons, Lapine, Ore., outlet pipes, to an unnamed bidder.

NEW PROJECTS

6000 to 7000 Tons, Grand Coulee, Wash., 11 drum gates, American Bridge Co., Pittsburgh, low bidder.
 2800 Tons, Toledo, 72-in. pressure main for municipal intake line, Biggs Boiler Works, Akron, Ohio, low bidder on July 19 bids.

SHEET PILING

AWARDS

1457 Tons, Holyoke, Mass., dike, to Carnegie-Illinois Steel Corp., Pittsburgh.
 400 Tons, Chicopee, Mass., dike, to Bethlehem Steel Co., Bethlehem, Pa.
 132 Tons, Lawrence County, Ohio, State highway project, to Ben Tom Supply Co., Columbus, through Midland Construction Co., Columbus.
 100 Tons, Monroe County, Ohio, State project in Jackson and Lee townships, to Carnegie-Illinois Steel Corp., Pittsburgh.
 100 Tons, Adams County, Ohio, State project in Monroe and Green townships, to Carnegie-Illinois Steel Corp., Pittsburgh.

NEW PROJECTS

1057 Tons, Los Angeles, for U. S. Engineer, Invitation 509-40-1; bids Aug. 14.
 397 Tons, Niland, Cal., All American Canal; bids opened July 20.
 100 Tons, Carroll County, Ohio, State project in Rose township; bids July 29.

Cowles Detergent Co., Cleveland, has appointed Newton P. Armstrong as its representative in New England, with headquarters in Boston and Frederick H. Hitchcock as Michigan representative, with headquarters in Detroit. E. W. Hutchinson, who has represented the Cowles company in Detroit for many years, continues in that territory also.

General Electric Vapor Lamp Co., Hoboken, N. J., has been merged with the Incandescent Lamp Department of General Electric Co.

Truscon Steel Co., Youngstown, reports second quarter net income of \$143,531 compared with net profit in the first quarter of \$20,418 and net losses in the second quarter of 1938 of \$204,130, and \$395,144 in the first quarter of 1938.

NON-FERROUS...

...Producers raise copper prices to 10.375c.; leading smelter remains at 10.25c. . . . Spelter price boosted \$2 . . . Another week of heavy sales reported by lead sellers.

NEW YORK, July 25—Price chaos again reigns in the copper market, with buyers having their choice of at least three price levels. This confusing situation developed when a producer, late Friday afternoon, announced an increase of $\frac{1}{4}$ c. to 10.375c. per lb., Connecticut Valley, for electrolytic metal. With the exception of Phelps-Dodge, which has been maintaining 10.50c. for some time, the other producers adopted the

higher level. One leading custom smelter, however, continues to do business on the basis of 10.25c. The trade is at a loss as to the cause for the increase, but some think it may have been to provide the foreign price with better support or to avoid losing the advantage of a price increase should another buying wave occur. In the last wave the price was advanced in the midst of the heavy buying, and by the time the customary coverage at

the lower level was extended, the bulk of the material booked during the movement was at the lower level. Domestic sales have been on light side all week, although over the week-end a fairly substantial tonnage, around 9000 tons, was booked. Foreign purchases have been at a fairly even pace for some time, with the cartel regularly selling its pro-rata output.

Zinc

Although on the surface the market presented a rather dull appearance, sales in the past week amounted to about 14,000 tons, or more than double the preceding week's total. This unexpected increase is credited to several large consumers who quietly entered the market and filled up the gaps in their inventory. Over 12,000 tons were earmarked for July delivery, with 3500 tons for October and 1700 tons beyond that month. Smelter consumption shows little change; shipments in the week were about 4700 tons as against 4350 in the previous period. Following today's announcement of the week's heavy sales, one custom smelter boosted prices \$2 a ton to 4.99c. per lb., New York, but up to press time other selling interests had taken no action.

Lead

Another week of heavy sales was climaxed by the release of June statistics which showed output and shipments to be in surprising alignment. Output for the month was 38,986 tons, while shipments were 38,898. Stocks at the end of the month were 129,366 tons. Sales in the past week, while slightly below the previous period's figure, nevertheless were sufficiently large to force sellers to dip heavily into reserve supplies. At the end of the week, July requirements were about 98 per cent covered and August 60 per cent. If the present rate of buying is maintained for the remainder of the month, sellers predict a 42,000-ton month. Domestic quotations continue unchanged at 4.85c. per lb., New York, held at that level by the inability of the London price to move sufficiently high to permit an adjustment here.

Tin

The tin market was practically stagnant all week, with even the usual 5 and 10 ton business lacking. In the absence of buying, prices were nominal at 48.50c., New York, on Straits, most of the week, easing off to 48.45c. today. As a matter of record, the market has been so dull that current prices do not even represent the cost of importing new supplies.

NON-FERROUS PRICES

Cents per lb. for early delivery

	July 19	July 20	July 21	July 22	July 24	July 25
Copper, Electrolytic ¹	10.25	10.25	10.31	10.31	10.31	10.31
Copper, Lake	10.25	10.25	10.25	10.25	10.375	10.375
Tin, Straits, New York	48.50	48.50	48.50	48.50	48.45	48.45
Zinc, East St. Louis ²	4.50	4.50	4.50	4.50	4.50	4.60
Lead, St. Louis ³	4.70	4.70	4.70	4.70	4.70	4.70

¹ Delivered Conn. Valley. Deduct $\frac{1}{4}$ c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	49.60c.	51.50c.
Copper, Lake	11.50c.	11.50c.
Copper, electro	11.375c.	11.50c.
Copper, Castings	11.00c.	11.25c.
*Copper sheets, hot-rolled	18.37c.	18.37c.
*High brass sheets	16.65c.	16.65c.
*Seamless brass tubes	19.40c.	19.40c.
*Seamless copper tubes	18.87c.	18.87c.
*Brass rods	12.00c.	12.00c.
Zinc slabs	6.15c.	6.90c.
Zinc sheets, No. 9 casks	10.75c.	12.10c.
Lead, American pig	5.85c.	5.70c.
Lead, bar	6.45c.	8.25c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.00c.
Alum., virgin, 99 per cent plus	21.50c.	22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.00c.	19.50c.
Solder, $\frac{1}{2}$ and $\frac{1}{2}$	29.25c.	29.50c.
Babbitt metal, commercial grade	21.25c.	21.50c.

The new prices on copper alloy products had not been announced at time of going to press, but are expected shortly. They will apparently be proportioned on the basis of an $\frac{1}{4}$ c. rise in the price of the base metal.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3;

on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.	8.00c.	8.625c.
Copper, hvy. and wire.	7.00c.	7.375c.
Copper, light and bot-toms	6.125c.	6.50c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine compo-sition	6.125c.	7.00c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or com-pos. turnings	6.00c.	6.50c.
Lead, heavy	3.875c.	4.25c.
Cast aluminum	6.50c.	7.75c.
Sheet aluminum	12.25c.	13.75c.
Zinc	2.125c.	3.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York: Asiatic, 14c. a lb., f.o.b.; American, 12c. a lb. QUICKSILVER, \$88 to \$90 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 10.50c. a lb.

U.S. Steel Earns \$1,309,761 in Quarter; Shipments Drop

NET earnings before preferred dividend requirements of the United States Steel Corp. in the second quarter rose to \$1,309,761 from \$660,551 in the previous quarter, although shipments of finished steel in the same period declined 3½ per cent. In the second quarter of 1938 the corporation reported a deficit of \$5,010,426. After allowances for the regular quarterly preferred dividend of \$1.75 per share, which was declared payable by the board of directors, the June quarter's operations resulted in a deficit of \$4,995,158, as compared with a deficit of \$5,644,368 in the first quarter, after a similar allowance.

Net earnings, after taxes, but before depreciation and interest, were \$17,324,233 for the quarter and \$34,649,902 for the first six months. Shipments of finished steel in the period were at a rate equal to 48.2 per cent of capacity as against 50.2 per cent in the first

quarter. For the half year shipments equaled 49.2 per cent of capacity, as compared with 33.6 per cent in the corresponding period of 1938.

Average number of employees on the payroll in the first six months of the present year was 208,113, or less than 1 per cent above the average of the first half of 1938. Total payrolls in the first half of 1939 were \$163,461,751 against \$135,252,626 in the comparable period of the preceding year.

Commenting on the earnings report, E. R. Stettinius, Jr., chairman of the board, said, "Prices realized for steel products shipped during the second quarter remained at substantially the same low levels that prevailed during the early part of the year.

"Following the usual slowing down of operations over the Fourth of July holiday, the rate of production has advanced to levels better than those prevailing during the first half of the year. Shipments are keeping pace with production and there has been no accumulation of stocks at the mills. Foreign business is being well maintained."

REINFORCING STEEL

... Awards of 11,535 tons; 8,865 tons in new projects.

ATLANTIC STATES AWARDS

- 2300 Tons, Boston, New England Mutual Life Insurance building, to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., contractor.
- 760 Tons, Wilmington, Del., to Bethlehem Steel Co., Bethlehem, Pa., through Turner Construction Co., Philadelphia.
- 375 Tons, Washington, sewer project, to Bethlehem Steel Co., Bethlehem, Pa., through James Lombardi, Philadelphia.
- 500 Tons, Elmira, N. Y., reformatory, to Reecan, through C. F. Haglin & Sons, Buffalo, contractors.
- 500 Tons, Washington, Rock Creek diversion sewers, section No. 2, to Truscon Steel Co., Youngstown, through Joseph Lombardi, Philadelphia, contractor.
- 280 Tons, Bedford County, Pa., highway project, to Bethlehem Steel Co., Bethlehem, Pa., through J. H. Wickersham, Lancaster, Pa.
- 250 Tons, Bangor, Me., two schools, to Truscon Steel Co., Boston, through D. A. Sullivan & Sons, Inc., Northampton, Mass., contractor.
- 230 Tons, Brooklyn, superstructure, Plumb Beach Channel bridge, to Concrete Steel Co., Chicago, through Mill Basin Asphalt Corp., contractor.
- 200 Tons, Pike County, Pa., paving and bridge, route 220, to Bethlehem Steel Co., Bethlehem, Pa., through F. D. Kessler, contractor.
- 180 Tons, Bedford, Pa., highway project, to Bethlehem Steel Co., Bethlehem, Pa., through A. A. White, Lebanon, Pa.
- 110 Tons, Somerset County, Pa., sections 8C1 and 9A1, Pennsylvania Turnpike, to Bethlehem Steel Co., Bethlehem, Pa., through H. R. Dickens, Philadelphia, contractor.
- 109 Tons, Chicopee, Mass., dike, to an unnamed company; C. I. Hosmer, Inc., Greenfield, Mass., contractor.
- 108 Tons, Cumberland County, Pa., section 19D, Pennsylvania Turnpike, to Bethlehem Steel Co., through Walker Brothers, contractors.
- 100 Tons, Fredonia, N. Y., Normal School, music building, to Buffalo Steel Co., Buffalo, through Sessinghans & Ostergaard, Erie, Pa., contractor.
- 100 Tons, Morris County, N. J., bridges, route

6, to Concrete Steel Co., through Eisenberg Construction Co., contractor.

CENTRAL AND WESTERN STATES

- 1532 Tons, Alameda, Cal., barracks for naval base, to Bethlehem Steel Co., San Francisco.
- 1200 Tons, University City, Mo., sewer project, to Laclede Steel Co., St. Louis.
- 500 Tons, Chicago, Western Avenue bridge, substructure, to Olney J. Dean Steel Co., Chicago.
- 500 Tons, Minneapolis, men's union building, to Concrete Steel Co., Chicago.
- 300 Tons, Walsco, Mich., County hospital and power house, to Ceco Steel Products Co., San Francisco.
- 300 Tons, Rochester, Minn., high school, to Bethlehem Steel Co., Bethlehem, Pa.
- 300 Tons, Los Altos, Cal., Permanente Cement Plant, to San Jose Steel Co.
- 275 Tons, San Francisco, Holly Park Federal housing project, rail steel to Simmons Co., San Francisco.
- 270 Tons, Cleveland, Central High School, to Truscon Steel Co., Youngstown.
- 150 Tons, Akron, Ohio, State highway project No. 57, to Pollak Steel Co., Cincinnati, through C. B. Moon, contractor.
- 100 Tons, San Francisco, Horace Mann Junior High School, to Soule Steel Co., San Francisco.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 3000 Tons, New Ellenville, N. Y., Lackawack Dam; bids in.
- 450 Tons, Warren County, N. Y., mostly mesh, highway project R.C. 4052, Lane Construction Corp., Meriden, Conn., low bidder, (previously reported).
- 340 Tons, Bedford County, Pa., section 14A, Pennsylvania Turnpike; bids July 27.
- 300 Tons, Prices Corner, Del., Cranston Heights viaduct; J. A. Bader, Wilmington, Del., low bidder.
- 250 Tons, Fulton County, Pa., Sideling Hill tunnel ventilation; Ritter Brothers, Harrisburg, low bidder.
- 107 Tons, Erie and Niagara Counties, N. Y., State bridge, project No. R.C. 4045, William J. Gallagher, Medina, N. Y., low bidder (previously reported).
- 100 Tons, Monroe County, N. Y., highway project R.C. 4051, C. P. Ward, Inc., Rochester, N. Y., low bidder (previously reported).

CENTRAL AND WESTERN STATES

- 2684 Tons, Los Angeles, river channel project for U. S. Engineer, Invitation 509-40-1, bids Aug. 14.

2650 Tons, Chicago, subway section D-1; bids announced last week for July 27 extended to Aug. 3.

1100 Tons, Fort Wayne, Ind., sewage plant; bids July 31.

1000 Tons, Cleveland, \$5,000,000 municipal light plant addition; bids Aug. 11.

900 Tons, State of Oklahoma, highway bridges; low bidders on general contracts, as follows: 126 tons, Moran Buckner, Muskogee, Okla.; 125 tons, Lee Poole & Sons, Fairview, Okla.; 369 tons, M. J. McNulty, Jr., Tulsa, Okla.; 147 tons, O. J. Pharo, Henryetta, Okla., and 125 tons, Ottinger Bros., Hinton, Okla. (previously reported).

500 Tons, Covington, Ky., housing project; H. B. Deal, St. Louis, contractor.

500 Tons, Rock Island, Ill., sewage plant.

483 Tons, San Francisco, Lincoln High School; bids taken July 26.

350 Tons, Minneapolis, Miller Vocational School.

305 Tons, Westmoreland, Pa., section 2C of new turnpike; Baldwin Brothers, Cleveland, general contractors.

300 Tons, Manitowoc, Wis., sewage plant.

200 Tons, Bozeman, Mont., Middle Creek storage building.

200 Tons, Oberlin, Ohio, Oberlin College auditorium; John Gill & Sons Co., Cleveland, general contractor.

150 Tons, Red Bluff, State highway bridges; bids Aug. 9.

125 Tons, State of Kansas; highway bridge; Maxwell Construction Co., Columbus, Kan.; low bidder on general contract.

100 Tons, San Francisco, city and County hospital addition.

CAST IRON PIPE

Vinton, Va., plans pipe lines for water system and other waterworks installation. Fund of about \$117,000 is being arranged for this street improvements.

Hopewell, Harrison County, Ohio, plans pipe lines for water system and other waterworks installation, including water treatment plant. Cost about \$63,000. Special election has been called July 28 to approve bonds for \$30,000 of amount noted. Carl J. Simon, Van Wert, Ohio, is consulting engineer.

Peshtigo, Wis., plans pipe line extensions in water system. Financing is being arranged through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Marysville, Wash., plans call for bids early in September for pipe lines for water system, including 9-in. line from Edwards Springs water source, to municipal storage tanks, about 12 miles. Cost about \$100,000, of which \$60,000 will be expended for pipe, fittings, valves, etc. Sievers & Deucy, 3124 Paine Street, Everett, Wash., are consulting engineers.

Tecumseh Township Board, Tecumseh, Kan., plans pipe lines for water system in different parts of township; also elevated steel tank and tower, and other waterworks installation. O. J. Eidman, New England Building, Topeka, Kan., is consulting engineer.

Morton Water District, Morton, N. Y., plans pipe lines for water system, including main line from Brockport, elevated storage tank and other waterworks installation. Cost about \$80,000. Lewis E. Kohl, Inc., 16 State Street, Rochester, N. Y., is engineer.

Borough Council, Hightstown, N. J., has placed award with United States Pipe & Foundry Co., for about 10,000 ft. of 10, 8 and 6-in. pipe for water system.

Henrico County Board of Supervisors, Richmond, Va., plans pipe lines for water system in Sanitary District No. 5, Lakeside area, and other waterworks installation. Cost about \$130,000. Willard Day is county engineer in charge.

Board of Water Commissioners, Denver, has awarded contract to Colorado Fuel & Iron Corp., Denver, at \$33,417.50 for 12 and 8-in. pipe for water lines in several streets.

Parker & Hill, Smith Tower Building, Seattle, consulting engineers, have been engaged to make surveys and plans for pipe lines and other waterworks installation for system in new public water district now being formed by residents of Fir Grove, Woolland, Spanaway and Brookdale, Wash., near Tacoma, Pierce County. District will comprise area of about 30 sq. miles. Howard A. Leo, Fir Grove, is at head of project.

THIS WEEK'S MACHINE TOOL ACTIVITIES . . .

... July sales holding up well as compared with the June volume . . . Summer business ahead of expectations in some quarters . . . Diversification of sources a feature of present market.

Sales Ahead of Expectations Cleveland Builders Report

CLEVELAND—Aggregate business continues well above expectations here. While large new inquiries are scarce, prospective single machine sales include companies unheard of for many months.

Recent shipments include a large hydraulic grinder for a new steel plant in Indiana, lathes and other equipment for a Cleveland aircraft supplier, one or two new pieces for the local Westinghouse plant, and small items for Timken Technical School at Canton. It is said to be doubtful if the large new machine shop at Lima will require much buying, the principal purchase to date being a 60-ton crane.

Press manufacturers in the last week noted a considerable gain in inquiries as compared with the first two weeks of this month. Correcting a phrase in last week's report, press manufacturers reported first half sales through the Middle West about 25 per cent ahead of the first half last year. Last week the word "ahead" was inadvertently omitted.

Cincinnati July Volume Equal to That of June

CINCINNATI—The July volume of machine tool business in this area is on a parity with that of June. The market picture is substantially optimistic.

There is no change in factory operations and except for some vacations taken during the Fourth of July holiday week, no shutdowns for this month are reported, although rumors of some probable vacation periods during August are heard.

Satisfactory Volume Reported By New York Dealers

NEW YORK—Incoming orders are reported by most New York dealers to be in satisfactory volume. Sales for the month as a whole should compare favorably with those of June, and in the case of one concern will be considerably better. What is giving particular satisfaction at this time is the better diversification of buying. While arsenals and Navy yards continue to be important factors in recent sales, as well as the aircraft engine and accessory makers, a greater percentage of the present volume is coming from general industrial sources. The immediate future is encouraging since there are a number of proposals out on which action is expected within the next week or so.

Chrysler Extending Manufacture of Plastics

DETROIT—Tool and die work on 1940 model requirements is being pushed to completion by all of the automobile companies except General Motors, still strike-stymied. Buying for the General Motors Detroit transmission plant, which will build the Buick-Oldsmobile automatic type, has been completed so far as major equipment is concerned. However, jigs and fixtures are still a matter to be settled in some instances and the company's buyers are concentrating now on such items as gaging requirements which are understood to be quite extensive. Chrysler is maintaining its interest in plastic parts of its own manufacture and

last week installed a machine which is its third intended for production purposes. Further purchase of plastic molding equipment in the not too distant future appears a likelihood which should be watched closely.

Mixed Results in Chicago But Outlook is Hopeful

CHICAGO—Diverse opinions are offered by local sellers as to the current status of machine tool demand. One large sales agency is much encouraged by the increase in orders from small plants. Distribution, this office states, is already 50 per cent ahead of last month, and though dollar volume may not be as high as in June, officials are definitely pleased with the situation. Another large machinery dealer, however, is noticing the usual seasonal effect of July on his business, both in machine tools and small tools. His optimism is undiminished for fall prospects, but orders over the past two weeks are decidedly less. A third dealer, who sells nationally, terms Chicago activity less than in other sections of the country, such as Detroit and the East. He, too, nevertheless, feels that a great deal of potential business in this district should be coming out over the next several months. The Rock Island Arsenal has purchased some turret lathes and the International Harvester Co. is buying assorted equipment steadily for its tractor works in Chicago.

. . . GREAT BRITAIN . . . Commercial steel users in England hampered by large Government requirements.

LONDON, July 25 (By Cable)—Commercial business is improving, but expansion of demand is hampered by the inability of steel makers to give guaranteed deliveries owing to the vast governmental commitments.

A cargo of 8000 tons of sheet bars from Australia has arrived for rolling by South Durham steel companies. This is the largest single cargo of this nature ever imported into Middlesbrough.

The Continent reports that steel activity is improving slowly with a broadening demand for bars and shapes from Holland and Scandinavia. Finland and Sweden now are buying ship plates. The United Kingdom is specifying semi-finished material heavily.

Welsh tin plate is still in active demand, especially for home trade, where there is food reserve purchasing by householders, and militia camps are calling for increased quantities of tinned goods. Export sales have affected shipments to the end of the year. Output of tin plate in the United

Kingdom in May, including terne plate and black plate, totaled 88,700 tons; galvanized sheets, 84,600 tons.

Sheet rollers are fully sold for several months.

Stewarts & Lloyds, Ltd., are proposing the purchase of the Stanton Iron Works. Colvilles, Ltd., have made an arrangement with Barrow Hematite Steel Co., Ltd., whereby latter will close its heavy rolling mills for a period of 10 years from January next.

Woodward Iron Co. Ordered To Hold Employee Election

BRIMINGHAM—The Woodward Iron Co. has been ordered by the National Labor Relations Board to hold a collective bargaining election in 15 days to determine whether the AFL or the CIO union shall represent employees.

Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: 100 tons of pig iron from The Netherlands; 30 tons of chrome ore from India.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Spence Engineering Co., Grant Street, Walden, N. Y., manufacturer of pressure and temperature regulators, automatic valves, parts, etc., has acquired local plant of former Rider-Ericsson Engine Works, and will modernize for expansion. Executive offices are at 75 West Street, New York.

Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York, plans new three-story and basement refining and processing plant, with office building adjoining, at San Francisco. Cost over \$300,000 with equipment. Bids will be asked soon for general erection. San Francisco offices are at 75 Folsom Street. H. R. MacMichael is company engineer, last noted address.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until Aug. 8 for one jig boring machine (Circular 3); until Aug. 9, one motor-driven hollow chisel vertical-type power feed mortiser (Circular 8), 12 vertical-type milling machines, two knee-type horizontal milling machines, three duplicator horizontal milling machines (Circular 11).

William Prym, Inc., 2102 Forty-fourth Avenue, Long Island City, manufacturer of snap fasteners, pins and other metal goods, has acquired former Assawaga Mill of Angus Park Woolen Co., at Danville, Conn., comprising several large one and multi-story units, and will modernize for new plant.

Joseph E. Seagram & Sons, Inc., 405 Lexington Avenue, New York, plans remodeling and converting one of buildings at distilleries on Seventh Street Road, Louisville, for a mechanical-bottling works. Cost over \$65,000. Smith, Hinchman & Grylls, Marquette Building, Detroit, are engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 4 for 24 portable pneumatic grinders (Schedule 6829) for Brooklyn Navy Yard.

Federal Motor Truck Co. of New York, Inc., 551 Fifth Avenue, New York, representative for Federal Motor Truck Co., Inc., Detroit, has leased two-story building at West Thirty-fourth Street and Eleventh Avenue, about 43,000 sq. ft. of floor space, for new factory branch, service and repair, storage and distributing plant.

Merck & Co., 126 East Lincoln Avenue, Rahway, N. J., chemical products, plan three-story and basement addition, 40 x 100 ft., for which bids will be asked soon on general contract. Cost over \$100,000 with equipment. George P. Butler, Jr., 40 East Forty-ninth Street, New York, is architect.

Portable Machinery Co., 64 Lakeview Avenue, Clifton, N. J., wagon loaders and parts, and other mechanical-handling equipment, has let general contract to Mahoney-Troast Construction Co., 657 Main Avenue, Passaic, N. J., for group of one-story additions. Cost over \$125,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until July 31 for seamless steel tubing (Circular 36), steel wire nails and common wire nails (Circular 43), malleable iron harness loops (Circular 51), two automatic chucking machines (Circular 28), two universal tool and cutter grinders (Circular 33); until Aug. 7, eight 2500-lb. pneumatic control compression machine (Circular 10), one automatic machine for partial assembly of artillery primer (Circular 16), three smokeless powder mixers, one smokeless powder press, one smokeless powder and driving equipment macerating machine (Circular 2), one eight-spindle automatic machine, 2% in. capacity (Circular 25).

Karl Seiler & Sons, 4053 North Fifth Street, Philadelphia, meat packers, have purchased adjoining one-story building, on site 200 x 250 ft., for expansion.

Henry Disston & Sons, Inc., Unruh and Milnor Streets, Philadelphia, saws, files, tools, etc., has let general contract to Irving S. Towsley, Otis Building, for one-story addition, 60 x 70 ft. Cost close to \$40,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Aug. 1 for 16 cartridge loading machines (Circular 28), vertical press for bullet assembly, caliber 0.30 tracer; motor-driven straight line priming machine, caliber 0.50 case (Circular 29); until Aug. 2, horizontal toggle and crank case press, pocketing and heading, caliber 0.30; horizontal similar press for caliber 0.50 bullets; cartridge gaging and weighing machine, motor-driven, caliber 0.50; alternate bids desired on additional machines of three types noted (Circular 30); until Aug. 3, six vertical presses (Circular 31).

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., has approved plans for one-story addition to branch plant at Parlin, N. J. Cost close to \$50,000 with equipment.

◀ BUFFALO DISTRICT ▶

Daystrom Corp., Franklin Street, Olean, N. Y., metal products, metal stampings, etc., has let general contract to F. T. Coughlin, Third Street, for one-story addition, 120 x 270 ft. Cost over \$75,000 with equipment.

Fawn Beverage Co., 184 Sheridan Avenue, Elmira, N. Y., has let general contract to E. K. Personius Co., 98 Oakwood Avenue, for one-story addition to mechanical-bottling plant, 60 x 175 ft. Cost over \$50,000 with equipment.

◀ NEW ENGLAND ▶

Moore Drop Forging Co., 38 Walter Street, Springfield, Mass., has filed plans for one-story addition, for which general contract recently was let to Albert J. Daniels, 661 Main Street, Shrewsbury, Mass. Cost about \$60,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 1 for motor-driven low-pressure air compressors and spare parts (Schedule 6772) for Boston, Charlestown and Puget Sound Navy Yards.

Greenfield Tap & Die Corp., Greenfield, Mass., has asked bids on general contract for one-story addition, 70 x 165 ft., and two-story structure adjoining, 55 x 65 ft. Cost over \$65,000 with equipment. McClinton & Craig, Inc., 458 Bridge Street, Springfield, Mass., is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Aug. 2 for 7000 barrel reflectors, caliber 0.30 gun (Circular 15).

Torrington Co., Torrington, Conn., swaging machines, ball bearings, needles, etc., has let general contract to Stewart Construction Co., Ltd., Sherbrooke, Que., for one-story addition to branch plant at Bedford, Que. Cost close to \$50,000 with equipment.

◀ WASHINGTON DIST. ▶

Bureau of Yards and Docks, Navy Department, Washington, asks bids until Aug. 9 for boilers, oil-burning and coal-burning equipment, draft fans, heat-recovery equipment, water-cooled boiler settings, air and flue gas ducts, piping, etc., for power houses at Brooklyn and Portsmouth, Va., navy yards; naval air station, Pensacola, Fla., and naval operating base, Norfolk, Va. (Specifications 9289).

Potomac Electric Power Co., Tenth and E Streets, N. W., Washington, will begin work at once on extensions in steam-electric generating plant at Buzzard's Point, including new station building for high-pressure boiler and accessories, turbine-generator unit, additions in coal-handling plant, switching equipment and auxiliary equipment. Cost over \$1,000,000. Stone & Webster Engineering Corp., 49 Federal Street, Boston, is consulting engineer.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Aug. 15 for 1,000,000 brass clasps, 150,000 washers, 700,000 web strap buckles, 5000 gross of brass clinch tips, 40,000 studs, 40,000 eyelets, 40,000 buttons and 40,000 sockets (Circular 14).

General Purchasing Officer, Panama Canal, Washington, asks bids until Aug. 2 for 25,000 ft. of steel wire cloth, 60,334 ft. of copper wire cloth, 25,000 ft. of galvanized steel wire poultry netting, coil chain, wire rope clips, galvanized anchors, galvanized malleable iron snap hooks, safety valve units, etc. (Schedule 3519); until Aug. 3, split dies, stone drills, carbon steel twist drills, files, ratchet braces, bolt dies, hacksaw frames, sledge hammers, pipe wrenches, 36 sets of pipe die stocks, hand taps, machinists' bench vises, hose clamps and other equipment (Schedule 3523).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 1 for three engine lathes and equipment (Schedule 6793), milling machine, three plane machines and one set of additional equipment (Schedule 6794), combination contour metal sawing, filing and polishing machine (Schedule 6800), four drill presses (Schedule 6799), three single-spindle drilling machines with high-speed motor spindle (Schedule 6791), four precision bench lathes, with benches, including standard equipment (Schedule 6801), all-electric lathe, full automatic, double carriage, with standard equipment (Schedule 6802), three toolroom precision lathes (Schedule 6803), all motor-driven, for Alexandria, Va., yard.

◀ SOUTH ATLANTIC ▶

American Bakeries Co., Inc., 1310 Trade Street, Charlotte, N. C., plans extensions and improvements, including one-story addition, 75 x 125 ft., for loading and distribution, and equipment in baking and other departments. Cost close to \$55,000 with equipment. J. Norman Pease, 1236 Morehead Street, is architect.

United States Engineer Office, Jacksonville, Fla., asks bids until July 31 for one lot of fuel oil-burning equipment, mechanical pressure atomizing type, with assisted draft air control registers, steam turbine-driven blowers and duplex fuel oil-burner pump, strainer and heater set (Circular 16).

W. A. Sanford, Winter Haven, Fla., plans one-story fruit-packing plant, with conveying, mechanical-handling, loading and other equipment. Cost close to \$40,000.

United States Water Heater Co., Bessemer, Ala., has taken over plant of former Bessemer Foundry & Machinery Co., and is installing equipment for manufacture of automatic gas and electric water heaters. Operations are expected to start about Sept. 1. E. R. Parker is resident manager.

◀ SOUTHWEST ▶

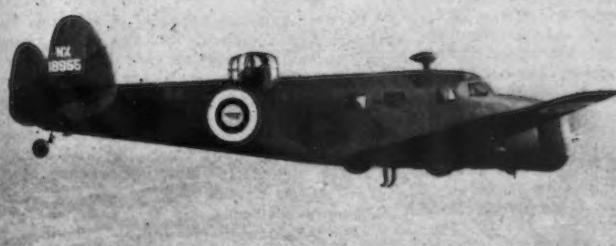
Waukesha Motor Co., Schulze Boulevard, Waukesha, Wis., manufacturer of diesel and gasoline engines, parts, etc., etc., has begun work on new one-story factory branch, parts storage and distributing plant at 615 Wheeler Avenue, Tulsa, Okla. Cost close to \$50,000 with equipment.

Boonville Mills Co., Boonville, Mo., has let general contract to Ryan Construction Co., Omaha National Bank Building, Omaha, Neb., for addition to grain mills for storage and distribution. Cost about \$65,000 with elevating, conveying and other mechanical-handling equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

John Morrell & Co., foot of Quincy Street, Topeka, Kan., meat packers, have engaged Henschien, Everds & Crombie, 59 East Van Buren Street, Chicago, architect and engineer, to prepare plans for six-story and basement addition, 100 x 150 ft., for expansion in meat processing, lard refining and other divisions. Cost over \$125,000 with equipment. Main offices are at Ottumwa, Iowa.

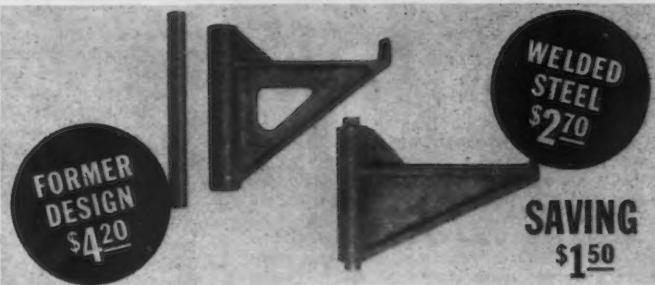
City Council, Augusta, Ark., plans expan-

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Photo courtesy Lockheed Aircraft Corp., Burbank, Calif.



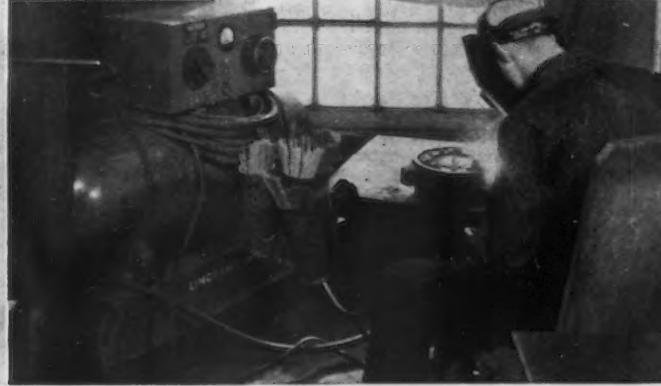
2. Welded steel design cuts costs by reducing the weight of material and by simplifying manufacture. Usually, the larger the part the greater the savings, although many small parts such as the swinging bracket illustrated above can be weld-economized. Try it!

Courtesy Rogers Bros. Corp., Albion, Pa.



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Photo courtesy International Conveyor & Washer Corp., Detroit, Mich.



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Photo courtesy The Griswold Manufacturing Co., Erie, Pa.



5. To minimize costs on heavy machine parts: Form steel plate—hot if necessary—on brakes. Machine before welding. Use heavy fixture and positioning jig, so as to allow high-speed welding with large electrodes in down-hand position.

Photo courtesy Wellman Engineering Co., Cleveland, Ohio



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sion and improvements in municipal electric power plant, including new 500-kw. diesel engine-generator unit and auxiliary equipment. Cost close to \$50,000.

Model Oil & Refining Co., Kilgore, Tex., has approved plans for new oil refinery, with power house, pumping station, steel tank storage facilities and other operating structures. Cost close to \$150,000 with equipment.

Campbell-Taggart Associated Bakeries, Inc., 4050 Penn Street, Kansas City, Mo., has approved plans for one-story branch baking plant on Lemmon Street, Dallas, Tex. Cost over \$45,000 with ovens, mixers, conveyors and other mechanical equipment.

◀ WESTERN PA. DIST. ▶

Victoria Metal Co., Inc., Twentieth and Haybarger Streets, Erie, Pa., iron castings, etc., has let general contract to Bader & Schew, Ariel Building, for one-story foundry addition, 40 x 100 ft. Cost close to \$40,000 with equipment.

Monongahela School Board, Monongahela, Pa., A. J. Brown, secretary, asks bids until Aug. 7 for following equipment for industrial arts school: Forge, foundry and electrical equipment, including lathes, for general metal-working and electrical shop; also tools and equipment for woodworking shop.

Katherine Coal Mining Co., Gypsy, W. Va., has acquired properties of Hughes Mining Co., near Gypsy, and will modernize including installation of additional mining machinery, mechanical-handling equipment and other operating facilities.

◀ SOUTH CENTRAL ▶

Cleveland Tennessee Enamel Co., Cleveland, Tenn., affiliated with Hardwick Stove Co., same place, stoves, parts, etc., has begun erection of one-story addition, 60 x 125 ft., for expansion in enameling department, installation to include furnace unit and accessories, conveying and other mechanical-handling equipment. Cost close to \$60,000 with equipment.

Police Jury Airport Committee, Baton Rouge, La., A. A. Morvant, chairman, plans municipal airport on 800-acre tract near city, to include hangars, repair and reconditioning shops, engine test building and other mechanical units. Cost about \$800,000. Financing is being arranged through Federal aid.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Aug. 1 for electrical conductor and accessories for new 44-kv. line between Columbia and Victor, Tenn., totaling about 297,375 ft. of cable.

◀ MICHIGAN DISTRICT ▶

Motor State Products Co., Ypsilanti, Mich., automobile top frames and other automotive equipment, has let general contract to Redick & Zebley, 24 West State Fair Avenue, Detroit, for one-story addition. Cost close to \$40,000 with equipment. R. S. Gerganoff, Ypsilanti, is architect.

Fruehauf Trailer Co., 10940 Harper Avenue, Detroit, motor trailers and parts, plans one-story addition, 50 x 320 ft. Cost about \$85,000 with equipment.

Chrysler Corp., 341 Massachusetts Avenue, Detroit, has plans for one-story addition to Highland Park automobile works, to be equipped as a dynamometer shop. Cost close to \$50,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

American Coach Co., Cassopolis, Mich., recently organized to manufacture motor trailers, has leased space in buildings formerly used by Kellogg Switchboard Co. for plant, including parts manufacturing and assembling divisions. Company has acquired Ideal Mfg. Co., Mishawaka, Ind., manufacturer of similar coach trailers, and will consolidate. Norman Wolfe, formerly president of Wolfe Body Co., Detroit, heads new company, associated with Ralph Kennedy, previously connected with Ideal company, noted.

◀ OHIO AND INDIANA ▶

Inland Mfg. Co., Division of General Motors Corp., Dayton, Ohio, steering wheels and other automobile equipment, has let general contract to F. X. Minnigan, 16 Bates Street, for two-story addition, 38 x 80 ft. Cost close to \$40,000 with equipment.

Ohio Farm Bureau Federation, 246 North High Street, Columbus, Ohio, has asked bids on general contract for new commercial fertilizer plant at Cincinnati, consisting of two main one-story units, 120 x 220 ft., and 100 x 120 ft., with power house and auxiliary buildings. Cost about \$200,000 with equipment. Carlton, Frankenberger & Batson, 1816 Central Parkway, Cincinnati, are architects.

Lau Blower Co., 954 East Monument Avenue, Dayton, Ohio, mechanical blowers and parts, blower housings, furnace casings, etc., plans one-story addition. Cost close to \$40,000 with equipment. Hermann & Brown, Reibold Building, are architects.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until July 31 for propeller blade assemblies, 8-ft. 6-in. diameter (Circular 14), duplex submerged centrifugal sewage-ejector equipment (Circular 15); until Aug. 8, carburetor assemblies (Circular 11); until Aug. 11, exhaust collector ring assemblies, joint assemblies and assembly assemblies (Circular 9).

Board of Directors, St. Joseph Riverside Hospital, Warren, Ohio, plans extensions in power house, including additional equipment. Fund of about \$250,000 has been arranged for this and other expansion. Keich & O'Brien, Union Savings & Loan Building, are architects.

Leland Electric Co., Webster Street, Dayton, Ohio, electric generator sets, motors, parts, etc., plans one-story addition to Canadian branch plant at Guelph, Ont. Cost about \$45,000 with equipment.

Contracting Officer, Quartermaster Corps, Jeffersonville, Ind., asks bids until July 31 for cross-cut hand saws, axe handles, hammer handles, etc., and about 23,800 lb. of animal shoes (Circular 431-4).

◀ MIDDLE WEST ▶

George D. Roper Corp., Blackhawk Park Avenue, Rockford, Ill., manufacturer of stoves, ranges, parts, etc., has asked bids on general contract for one-story addition, 70 x 72 ft., for expansion in enameling division. Cost close to \$40,000 with equipment. Bradley & Bradley, Brown Building, are architects.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until July 31 for six automatic milling machines (Circular 30), high-speed steel T-slot cutters, form milling cutters, dovetail cutters, broach and 156 sets of thread chasers (Circular 31).

Dolton Mfg. Co., Inc., 146th Street and Princeton Avenue, Chicago, John W. Gifford, head, recently organized, has arranged for purchase of poultry equipment division of Laidlaw Wire Co., Monmouth, Ill., and will remove to industrial property at first noted address, where it will be operated as a new line of production and expansion carried out.

Iowa Electric Co., Security Building, Cedar Rapids, Iowa, plans extensions and improvements in hydroelectric power plant on Maquoketa River, near Maquoketa, Iowa, including additional equipment. Cost close to \$100,000. Harza Engineering Co., 205 West Wacker Drive, Chicago, is consulting engineer.

City Water Department, Montrose, Colo., has asked bids on general contract for one-story equipment storage, service and repair building, 48 x 125 ft. Cost close to \$40,000 with equipment. Burton Lowther, Colorado Building, Denver, Colo., is consulting engineer.

Malleable Iron Range Co., Beaver Dam, Wis., stoves, ranges and parts, plans one-story addition. Cost about \$45,000 with equipment.

Milwaukee Road, Union Station, Chicago, has let general contract to Anderson Construction Co., 619 North Main Street, Council Bluffs, Iowa, for remodeling engine house and

shops at Council Bluffs, to replace damage caused by recent storm. Cost about \$40,000 with equipment.

Soy Bean Processing Co., 1600 Westfield Avenue, Waterloo, Iowa, has asked bids on general contract for new power house, installation to include 125 to 150-hp. boiler unit, stoker, coal unloaders and handling equipment, and auxiliary equipment. Cost over \$40,000. Helmick, Edeskut & Lutz, Essex Building, Minneapolis, are engineers.

◀ PACIFIC COAST ▶

Bendix Aviation Corp. of California, Ltd., Union Air Terminal, Burbank, Cal., aircraft and automotive products, has let general contract to MacIsaac & Menke, 6624 Stanford Avenue, Los Angeles, for one-story addition, 81 x 180 ft., with office unit adjoining, 20 x 140 ft. Cost over \$70,000 with equipment. H. L. Gogerty, 6272 Yucca Street, Hollywood, Cal., is architect. Main offices are at 105 West Adams Street, Chicago.

Bureau of Yards and Docks, Navy Department, Washington, is completing plans for new naval supply depot at Oakland, Cal., for which appropriation recently was approved in amount of \$300,000 for land purchase and structures as follows: General storage and distributing buildings, \$1,330,000; magazine wharf, \$875,000; equipment building, \$100,000; dry provision storage building, \$255,000; cold storage and refrigerating plant and building, \$575,000; heavy materials and equipment building, \$255,000; paint and oil storage building, \$255,000; power house and central-heating plant, \$200,000; automobile service and garage building, \$40,000; lighters, cranes, and other handling equipment, \$6,500,000; general equipment and rolling stock, \$540,000; railroad tracks, \$225,000. Bids for different units will be asked soon.

Mutual Brewing Co., Ellensburg, Wash., has let general contract to Frank Oechsner, Ellensburg, for one-story addition, 46 x 100 ft., for a mechanical-bottling works. Cost close to \$45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Aug. 4 for one motor-driven universal turret lathe (Schedule 6808), five indicators, two shaft transmitters, one frequency control apparatus, one rotary converter, two sets of propeller shaft gears and spare parts (Schedule 6818); until Aug. 8, electric cable (Schedule 6819) for Mare Island Navy Yard.

Kern County Union High School District, Bakersfield, Cal., plans new vocational shop at local high school. Cost about \$178,000 for building and equipment. Appropriation in that amount is being arranged in 1939-40 budget.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for boilers and auxiliary equipment, forced and induced draft fans, pumps, combustion control apparatus, incinerator, gasoline engine-driven generator unit, air compressors and accessory equipment for power plant at naval air station, Alameda, Cal. (Specifications 8619).

◀ FOREIGN ▶

Department of Government Railways, Sydney, New South Wales, Australia, will receive bids until Sept. 6 for following machine tools for shops: Turret and center lathes, boring machine, boring and turning mills, shapers, milling machines, grinders, slotting machines, punching and shearing machines, drilling machines, and flash butt-welding machine (Specifications 1353).

Rayon Silks, Inc., Vancouver, B. C., recently organized, has acquired about 32-acre tract formerly held by Capilano Lumber Co. on North Shore, for new cellulose rayon mill. Initial plant will comprise one-story units, with power house, pumping station, machine shop and other mechanical departments. Cost about \$350,000 with machinery. Later a larger mill will be built on neighboring site, to cost close to \$2,000,000. Frederick Dawson is president.